PHYSICO-CHEMICAL AND BIOLOGICAL ASSESMENT RELATION TO QUALITY OF RIVER PAISUNI IN KARVI DISTRICT (CHITRAKOOT DHAM)

THESIS

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CERTIFICATE

This is to certify that the work entitled "**PHYSICO-CHEMICAL AND BIOLOGICALASSESEMENT IN RELATION TO QUALITY OF RIVER PAISUNI IN KARVI DISTRICT (CHITRAKOOT DHAM)**" is a piece of researchwork done by Renu Mishra under my guidance and supervision for the degree of Doctor of Philosophy in Zoology of Bundelkhand University, Jhansi (U.P.), India. The Candidate has put in an attendance of more than 200 days with me.

To the best of my knowledge and belief the thesis, embodies the work of the candidate himself. It fulfils all the requrement of the ordinance relating to the Ph.D. degree of the University.

Thesis is standard one both in the respect of contents and language. It is referred for the evaluation by the examiners.

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DECLARATION

I hereby declare that the thesis entitled **"PHYSICO-CHEMICAL AND BIOLOGICAL ASSESMENT IN RELATION TO QUALITY OF RIVER PAISUNI IN KARVI DISTRICT (CHITRAKOOT DHAM)"** is completed by me under the kind guidence and supervision of Dr. K.V. Singh Ex. Reader and Head of the Deptt. of Zoology, Pt. J.N.P.G. College, Banda. This is submitted to the Bundelkhand University, Jhansi (U.P.) in fulfilment of the requirement for the award of the degree of Ph.D. This thesis is my original piece of work. Any part of it or thesis has not been previously published or submitted for the award of any degree.

As regards the litrature concerned journals etc. were consulted in libraries of Lucknow, Chitrakoot, Sagar Universities. I participated in U.G.C. National seminars in which I presented two research papers "Management of pollution in River Paisuni at Chitrakoot Dham, Karvi" and "Uses of animals wastes as Biofertilizers for high yield of organic production and soil quality".

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INTRODUCTION

INTRODUCTION

Nature is beautifully balanced and each little thing in it has its own place, role and utility. Water is one of the important part of it. Which is very essential for all the living beings. As in a man's body 70% water is in blood. Therefore it is essential for the life activities of human beings and other organisms. About 73% of the earth is covered with marine and fresh water, which is present in the forms of oceans seas, glaciers, rivers, lakes, ponds etc.

The general survey reveals that about three fourth of the globle is covered with water which is estimated to be 1.5 X 10^9 million cubic kilometers. In spite of this, all water is not potable water because 97% of our planet's water is marine formed in seas and oceans, and the remaining 3% is fresh water, about 2% of this fresh water is frozen in the form of ice and glaciers and is not available for human consumption only 1% fresh water is available for use by human beings of which approximately 0.4% fresh water is surface water in the form of lakes, ponds and rivers etc., while the remaining 0.6% is present at under ground water.

In India only 19% people get drinking water, whereas the rest 81% quench their thirst by contaminated water through rivers, lakes, tanks and wells due to which more than three millon people are get affected or die of enteric diseases as Joundice, Polio, Dysentry, Cholera, Typhoid, Gastro-Enteritis and various parasite born infections every year.

As per study conducted by U.N.O. and published in 1978, the availability of fresh water in Asia is only 3000 cubic meter/person/year. Till 1955, India is reported to have enjoyed higher per capita fresh water availability but due to excessive demand and population pressure, per capita availability of fresh water is estimated to be around the 2500 cubic meters per year by the year 2005, dire progrosis is

that India may reach a state of water stress when the annual per capita availability may fall to 1000 cubic meter or less as reported by Krishanan, C.N.R. (The Hindu, June 4,2000). Which is really alarming.

Having in view the water crisis the Government of India is very serious as regards this. Therefore this year 2007 was in the name of water year (जल वर्ष). In which various measures are being executed to overcome the water problem.

Fresh surface water is in the forms of lentic and lotic. Lentic water is used for fish culture and also some are managed by state fisheries department which includes mainly ponds. Where as lotic water is exclusively rivers, Fortanately a number of rivers are found in India. Which are of great value to fullfil various needs of human beings, and also play a vital role in ecology. On the basis of origin the rivers are of four catgaries i.e. Himalayan, Plateau, coastal and desert.

In our country the majar rivers are viz-Ganga, Yamuna, Brahmani, Narmada, Brahmaputra, Cauvery, Godavari, Indus, Krishna, Mahanadi, Mahi, Sabarmati, Tapti, Perrior Subar-narekha. Besides there are many other rivers.

The Ganga is the holiest river of India. It's origin from Himalaya, so it is Himalayan river. A number of tributarius of it are Ramganga, Gomati, Ghaghra, Gandak and Kosi, while the southern water shed is formed by the river Yamuna, it is also a important river. The water in rivers is derived from mealting Glacears, rain, or less frequently hail, snow, sleet, Rivers are major resource of surface water, which can be easily taken, Therefore from the very ancient times the town and cities started developing along the banks of rivers. Rivers in the upper part of catchment area are usually clean but on their way to wards the sea they are recipient of sewers industrial effluents and many other unwanted meterials in their course of flow, which cause deterioration in natural nature of water. Therefore they become

highly polluted. Though the rivers have the capacity of self purification during its long course, but the pollution load is so much that all the rivers still remain badly polluted. As the river Kali is most polluted river.

The water pollution has been most exploited due to increasing population, urbanisation, industrialization, increasing living standards and broad spherees of human activities. These all are created by humans in their vested inferest neglecting the general impact, As the moral awakening rules and regulations in maintaing the piocity of the rivers which should be executed strictly. The water becomes inadequate even for the normal living and is getting polluted due to domastic sewage, muncipal solid wastes, fertilizers, pesticides inseticides, detergents etc. consequently water near highly industrialized cites in India (Such as Bombay, Pune, Chennai, Durgapur, Calcutta, Delhi, Kanpur, Mathura, Agra etc.) have been chronically polluted.

Water plays an important role in sustaining various form of life on the earth. Infact water is a precondition of life. It is also being put to use for various industrial and agricultural purposes and thermal power generation and drinking water supply etc. So water is an inexhaustible gift of nature. However its uneven distrubution in space and time has often threatened human welfare, livelihood and economic development.

The growing scarcity of water has been the result of rapidly growing popultion rising demond for food and crops, increasing urbanization and industrialization for rising standard of living. These will increase the acuteness of the problem of water scarcity in future.

The last ten years have witnessed the publication of numerous articles reported on the precarious nature of the Himalayan aquatic environment and the

increasing stress upon its components (singh & Kumar 1989). Aquatic environment are among modified habitats as a consequence of industrial development. Since water is the source of most requirements for fish. Any mixing to the living medium is likely to adversely affect their entire life.

Approximately 70% of the population of the world is domiciled in buildings connected to sewage treatment system. The majority of these systems have been inadequate or inefficient and consist mainly of either primary or secondary treatment. About 7 or 8% of industrial waste waters are also disposed of in municipal sewer systems.

A part of the agricultural water is consumed for plant growth evaporation and in plant transpiration. Almost 90% is consumed and 10% returns as waste water, carrying chemical fertilizers, herbicides, insecticides and pesticides etc. Mostly in our cities water is supplied for domestic uses like drinking, coocking, bathing etc. It returns as waste water with all kinds of unwanted materials, which is used in the house hold activities. An average of 20 to 80 % goes down into the drains from the household as waste water. This waste water goes to the water bodies with out any treatment, it would obviously deteriorates, The quality of entire water wealth.

The important pesticides and insecticides are DDT, BHC, dieldrine benzene, hexachloride, endosulphan, endrex, folidoldemeton, phosphamidon etc, chemical fertilizers are used in agricultural fields like urea and superphosphates are washed down into fishery ponds and nursery tanks, rivers etc. so it is proved to be harmful to all sorts of aquatic organisms.

In recent years a new type of steam pollution thermal pollution has attracted considerable attention. This is the discharge of heated water from electricity generation station, It has some adverse effects like a changes in the viscosity of

the water, abnormal high temperatures may faster an excessive development of aquatic weeds, sewage fungus and change to some extent, the nature of plankton. This affects upon the biology of fish also.

Besides, the organic pollution is due to Bacteria, which develop inorganic matters, and many of the molecules of water that- travel down the rivers in densely populated areas which pass through the human physiological system several times- possibly 10 to 40 different bodies, before reaching the ocean, Even the drinking water has been treated to kill most of the bacteria. The rivers have been used as repositaries for vast quantities of domestic and industrial waste products having an unknown fate and largely unknown biological effects. The presence of potential human health hazards from persistent bioaccumulative chemicals may bemore readily detected by analysis of aquatic organisms than by analysis of water samples (NCRT 1984).

A part of the living process has been to get rid of unwanted material. Otherwise organisms die of due to the toxins in their own waste. The biological process for ridding the body of wastes is excretion and occurs in some way in all living creatures.

Man and other vertebrates have several mechanisms for removal of harmful matters. As in human beings, the skin eliminates, unwanted water, salts and carbondioxide, the liver is an important detoxitying organ. The kidneys purify the blood and expel the wastes through the urinary system. The urine of which about 1.5 liters get excreted daily by a human adult, has been mostly water with dissolved nitrogenous wastes and salts. The urine also carries away foreign substances like drugs and other toxins These wastes reach in sewage and drained into the water bodies. Thus the water becomes polluted.

The water pollution is caused by various ways. To overcome the food problem for the alarming rate of the growing population has "Green revelution" was introduced by the Government of India under, which hybrid seeds are being used which require the use of pesticides, chemical fertilizers, insectides, weedicides along with much irrigation. As the irrigation recorted data reveal that the consumption of nitrogenous fertilizers in India in 1986-87 was 5-7 million tonnes, which became 9-8 million tonnes in the year 1995-96. Global consumption of Nitrogenous fertilizers which was 727 million tonnes per year in 1994 is estimated to increase to 1225 million tonnes per year by the end of the 21st century. These fertilizers after irrigation of crop fields leach in water bodies by run off and cause various physiological and pathomorphological ill effects on fishes and other aquatic biodies which causes the entire water harmful for all other use of human beings.

In India, agricultural food production has increased considerably during the recent years, but the percapita availability of food is still low besides the cereals do not contain enough protein, fat and calories, Hence we have to exploit our seas, rivers, lakes, respervIors, ponds resources, which extensively contains the capability of producing fishes and some other aquatic edible animals. which are utilised by man as the substitute of food, which is with rich protein contents.

At present Japan and Russia are the top most countries, which are producers of fish in the world. While the India is at the seventh position in the world In fish production. The Government of India and the state Govt. take the meation named "Blue revelution" for the fish production.

Aquatic animals are good markers to gauge the extent of water pollution. No rivers is in a satisfactory as regards fisheries. Water plays the most important role. Since ecology determines the habitability and abundance of flora and fauna in different sections. Hora (1940) was first to realize that the pollution in streams is likely to affect fishes.

At present riverine water pollution is quite alarming in India a few studies have made on the effect of pollution of natural waters and the occurrence of fishes (Bhimachar and david, 1946 Banerjee et. al. 1950, Motwani et. al. 1956, Banerjee 1960, Siddique 1960, Tondon and dhawan 1967, Toor and gill 1974, Hussain 1976, Duda 1982, Sehgal 1984). A significant reduction in the growth and fecundity of the fishes inhabiting waters subjected to the sewage pollution has also been reported (RajKumar et. al. 1984) so, the pollution of river water has received our attention in recent years only which is beyond self purifying capacity, which is causing human health hazards, and also adversely affectes the aquatic fauna and flora.

The Niagara river is one of the most chemically contaminated water bodies in North-America. High levels of contaminants have been documented in the sediments of the Niagara rivers and eastern lake Erie area near Buffalo, New york (Black et. al. 1984, NRTC 1984).

Recently in 1991-92 a National river action plan (NRAP) has been proposed by the Government of India to take up works in grossly polluted water bodies for which the stretches are made for major rivers of the country. The rivers are proposed to be included in NRAP which will be based on pollution critaria to be studied by central pollution control bord (CPCB).

Increasing infiltration of organic or domestic wastes and city sewage in fishery water results in the over abandance of water weeds. This affects fishery by choking the water body and hence hampering fishery operations and fish movements. Therefore the weed control is essential for important activities in fishery waters.

Joshi (1974) Ramchandran and Ram Prabhu (1968) reported most effective chemical weedicide for floating, emergent and submerged weeds. However, its

application has indicated severs toxic effects on fishes, especially at higher concentration. It causes mortality as also seen by Davis and Hughes (1963), Kaniewsha (1975). Where as the lower concentrations, also causes cellular aberrations in other aquatic organisms so the suitable method for weed control is essential, besides nitrogenous rich contents should be checked draining in the river.

The quality of water is scientifically determined by its physico-chemical and biological characteristics. As the contamination in water is caused by various types of domestic sewage and industrial effluents ect into natural water result inchange of water quality and eutrophication.

The other important sources of water pollution include mass bathing, disposal of dead bodies rural waste matters agricultural runoff faecal matters on open land and solid waste disposal. (Tiwari, 1992) Such heavy load of pollution makes the water unsuitable for various uses.

In water bodies aquatic Biota also develop because for living being. Water is most essential the presence of plankton density also affects the fish production. The population of plankton fluctuation are found due to various factors in water and meterological conditions. As zooplankton show vertically, diurnal and seasonal variations, whereas phytoplankton have mainly seasonal fluctuations effected by rainfall, photoperiod etc.

The said over all impact effects physico-chemical nature of the water, which influence the biota of the water body. Hence all such factors are considered in the study of the river understudy.

At present the ecological studies by their monitoring all the rivers are quite important, becaus e all have lost natural nature and have become polluted. Having this in view the river Paisuni, which has its siginificance due to in religious place

Chitrakoot was studied with a scientific approach in all respects for well being of this river.

The river Paisuni is a holy river, It's stretch from the Raghava Prayag Sangam at Ramghat in Chitrakoot, which is due to the confluence of rivers Mandakini, Gayatri, and Paisuni, towords north from this place on words on northan side Paisuni flows. There is a ghat known as Ramghat as in Ramayan is a mention that " चित्रकूट के घाट में भई सन्तन की भीड़ तुलसी दास चन्दन घिसे तिलक करें रघुवीर ".

The lord Ram Came to Chitrakoot in Tretha uga, so this place has its international fame. Besides this milk dhara emerged from this place, hence the name of this river was named Paisuni literally means milk river. This river is a plateau river. At the end it confluences with Yamuna at Kankota village near Rajapur Karvi.

The river flows in a south to north diraction. It is a narrow river due to its origin from plateau. It's latitude $25^{0}4$ N longitude $80^{0}45$ E and from sea level at 135 meter height. Every where it is polluted. During the Monsoon season various water chanals drain at different places in this river, which are Tiraha, Jhari, Geduwa. The pasin of the river ' Paisuni is steep' with little vegetation and their is some caltivated lands.

The intre stretch of the river Paisuni is about 45 kms. under study. On the eastern and western banks of the river are many villages.

Due to this dense population the human activities and very mucheg-Human settlement pathing, detergents, cattle activities, domestic sewages, municipal solid wastes and uses of chemical fertilizers, pesticides, Insecticides in their agricultural crop, which run off by rain washes in the river. All the above factors cause pollution. In the residential and pilgrims area, such as Ramghat waste water often enters openly in the river It is also creat more pollution.

On the occassion of Amavasya of every month a large number of pilgrims mainly from the entire Bundelkhand region come to take dip in the river Paisuni. Then after go to Kamtanathji temple for dershan and parikrama, which is located on the hill named as Kamadgiri. Besides a number of people go for "Deepdan" in this river as those people excrete their faecal matters on the open land in the adjoining area, which ultimately putrify and by some other means reach in the river water, due to which very high organic pollution in this river is caused, simultanse only the faecal bacteria also cause surrounding environmental pollution.

International Biological Programme (I.B.P. News No. 1 & 2 1964-65) have suggested that special attention should begiven to the fresh water bodies, which could be used for fish production, keeping in view the need for enviournmental protection. The Indian parliament passed the water Act. 1974. Which became effective from 23rd March 1974. The CBPCWP was constituted in Sept. 1974 This act was also amended in 1988.

Having in view this river has not yet been studied. The above factors of this holy river is taken for its scientific analysis of water by taking in consideration its physical, chemical and biological factors for the assessment of its water quality as regards its potability and suitability for aquatic biota, and to make out the pollutants and the pollution causes by monthly monitoring of this river. Further the recommendations will be made to make the natural nature of this river with out any contamination and the conservation of the river, because its basin is very narrow.

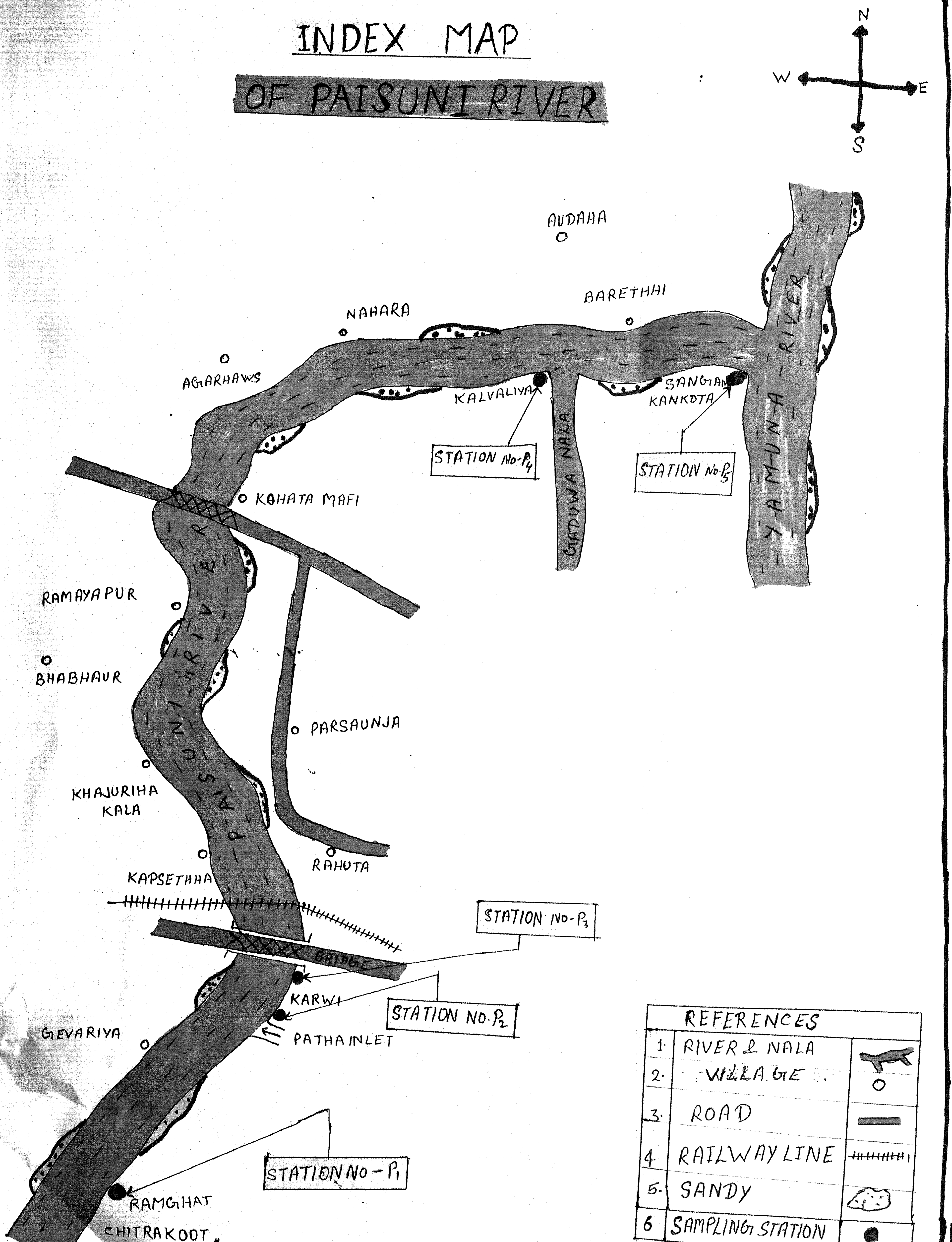
As regards the present study in detail it was carried as mentioned here with the water analysis of this river to assess its quality was done by taking various required parameters for its physico-chemical and biological nature as physical factors are water temperature, turbidity, colour, water current and chemical factors are Hydrogen Ion-concentration (P^H), carbonates (Co_3) Bicarbonates (HCO_2) Total

alkalinity, Total Hardness, Carbandioxide (CO_2), Chloride, shulphate, Phosphate, Disolved Oxygen (D.O.), Bilogical Oxygen Demond (B.O.D.). Chemical Oxygen demand (C.O.D.), Ammonical Nitrogen (NH_4-N), Nitraite (NO_2-N), Nitrate (NO_3-N), Sodium (Na), Potassium (K), Flouride (F). Where as biological factors are total caliform (M.P.N.), Microflora and Macroflora, Microfauna & Macrofauna, Besides metrological conditions have direct impact in this river water. Futher the pollutants also effect the water.

Having in view all these factors, the five stations where selected, so that the entire river ecology might be studied. The stations are Ramghat, Pathainlet, Patha out let, Kalvaliya, Kankota. The stations ditals are included in the methodology.

The main aim of the study is to suggest various scientific measures to manage properly this large water body for the maximum fish production and drinking purpose. And to it's suitability for human walfare and pilgiams.

INDEX MAP
OF PAISUNI RIVER



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1.	RIVER & NALA	
2.	VILLAGE	o
3.	ROAD	
4	RAILWAY LINE	
5.	SANDY	
6	SAMPLING STATION	●

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Presently Riverine system throughout the world, carries dangerous load of pollutants, as a result of heavy descharge of domestic wastes, muncipilal wastes. Industrial effluents, agricultural run off and soil errosion. The present section deals with the Important contribusions done in this field. In foreign countries more work has been done in comparision to India on Hydrobiology. But reciently more scientific study of various water bodies is being carried out by Physico-chemical and biological analysis. Besides under this study the impact of meteorological condisions are also considered for upto the mark study of the river Paisuni. As regards this theimportant work done by various rearchers are mentioned as under :

Forbes and Richardson (1919) studied some recent changes in Illinovas river. Allen (1920) investigated the quantitative and statistical study of the plankton of the Sanjoaquir river and its tributaries near Stockton California. Juday (1922) studied the quantitative studies of bottom fauna in the deeper water of lake Mendota. Hodgetts (1922) studied some factors controlling the periodicity of fresh water algae in nature. Grifith (1923) studied phytoplankton in fresh water bodies and factors determining its occurrence and composition. Atkins et. al. (1924) reported the seasonal changes in the water and heleo plankton of fresh water ponds Wilbe (1927) did biological survey of the upper Mississippi river with special reference to pollution.

Adeney (1928) studied the Principles and practice of the dilution method and sewage disposal at London. Taylor et. al. (1928) investigated treatment for removal of chlorine from city water far use in aquaria. Roule (1930) reported the pH determination in the evaluation of crop ponds whitford (1930) studied the current effect and growth of fresh water algae. Butcher et. al. (1930) investigated variations in the composition of the river waters.

Ellin (1931) investigated the conditions of affecting fisheries in the upper Missouri river. Yoshimura (1932) studied the seasonal variation of Nitrogenous compounds contents and phosphate in the water of Takasuka pond, Japan. Atkin (1932-33) reported the chemistry of Sea water in relation to the productivity of the Sea. Juday et. al. (1933) noticed the carbon-di-oxide and hydrogen-ion-concentration of the lake waters of north eastern wisconsin Trans.

Swell (1935) worked out the Bionomics of fresh water in India II, on the fauna and their seasonal changes in the Indian museum compound tank. Biswas et. al. (1936) published the handbook of common water and marsh plants of India and Burma. Ellis (1937) the detected measurement of stream pollution. Misra (1938) studied the Edaphic factors in the distribution of aquatic plants in the English lakes. Luckey (1938) observed the protozoan plankton as indicators of pollution in a flowing stream.

Harvey (1940) observed the Nitrogen & phosphorus requirment for the growth of phytoplankton. Hora (1940) reported a callection of fish from the head of Mahanadi river at Rajpur. Chandler (1940) did limnological studies of western lake Erie-1 phytoplankton and certain physical and chemical factors of the Bass Bland region.

Mortimer (1941-42) reported the exchange of dissolved substances between mud and water in Lakes part I & Part II. Schroepfer (1942) analysed stream pollution and standard sewage. Inester (1943) observed the oxygen balance in polluted water. Biswas (1942-43) worked out the role of the common algal communities of the river Hoogly in the drinking water of Calcutta. Bhargava (1944) studied the Dal lake clean-up strategy, an exemple for others environmental conservation.

Chandler et. al (1945) reported limnology of western lake. Eriein, relation of limnological and meteorological conditions to the production of phytoplankton.

Drinking water standards were given in the public health report by U.S. public health service (1946).

Shingle et. al. (1946) sudied the management of farm fish ponds. Welch (1948) reported the limnological methods. Abdin (1948) did the physical and chemical investigations relating to algal growth in the river Nile. Nygaord (1949) investigated Hydrobiological studies of some, Danish ponds and lakes.

Potrich (1950) studied the biological measure of stream conditions sewage industry wastes. Ganapati et. al. (1950) carried out the factory effects from the mettur chemical and industrial corporation Ltd., Mettur dam, Madras and their pollutional effluents on the fisheries of the river Cauvery. Ganapati et. al (1951) studied the effects of the paper mills pollution in river Godavari at Rajahmandary. Olson (1952) studied the toxic water sewage plankton. John (1952) worked on the water pollution, and its effects on the public health. Hoak (1953) reported the water supply and pollution control sewage. Rao (1953) reported the distribution of algae in a group of small ponds. Whitlock (1953) investigated the application of chlorine in treatment of water.

Grant et. al. (1954) studied the development of toxicity in bluee green algae to the public health. Chacko et. al. (1954) worked on the plankton of three fresh water ponds in madras city.

Roy (1955) studied the plankton ecology of the river Hooghly at Palta. Ganapati (1955) worked out the diurnal variations in dissolve gases, hydrogen ion-concentration and some of the important dissolved substances of biological significance in three temporary rock pool in stream bed at Mettur Dam. Benoir (1955) investigated the relation of phosphorus content with algae blooms.

Ettinger (1956) reported the biochemical oxidation characteristics of stream pollutants. Maloney et. al. (1956) studied the toxicity of 6 chemical compounds in 30 cultures of algae, water sewage. Cains. (1956) reported the effects of increased temperature upon aquatic organisms. Odum (1956) investigated the primary production in flowing waters. Yount (1956) worked on the factors that control species numbers in Silver springs at Florida.

Webber (1957) published impacts of pH. Gandhi (1958), reported the fresh water diatom flora of Hirebhasagar Dam, Mysore. Saha et. al. (1958) determined the Physico-chemical qualities of Culcutta sewage from the view point of Pisciculture and the danger of feeding raw sewage to confined fisheries. Chakrabarty et. al (1959) reported a quantitative study of the plankton and physico-chemical conditions of the river Yamuna at Allahabad. Ward et. al. (1959) published the fresh water biology 2nd. edition. G and hi (1959) worked on the fresh water diatoms of a Sagar in Mysore.

Green (1960) worked on the zooplankton of the river sokoto. Hynes (1960) observed the biology of polluted water bodies. Philipose (1960) studied the fresh water phytoplankton of inland fisheries in Symposium on Algologyed. Westlake (1960) observed the water-weed and water management. Round (1961) studied on bottom algae of the English lake. Mervin (1962) worked on the algae in water supplies. Watanabe (1962) observed the biotic index of water pollution based upon the species number of bacillriophyceae in the Jokore river in hokkaido, Japan.

Bhaskaran et. al. (1963) studied on the pollution of Gomti river at Lucknow coupland and Whitforth (1963) worked on the O_2 metabolism in oklahoma fish ponds. Deshmukh et. al. (1964) reported the physico-chemical characteristics of Ambazari lake. Kothadarman (1964) reported the physico-chemical characterstics of Kahan river, Nagpur city. Hiltibron (1965) observed the chemical control of some aquatic

weed Alabana. Kamat (1965) worked on algae of the Kolhapur. Tarzwell (1965) suggested the biological problem in water pollution at U.S. Dhaneshwaar et. al (1965) reported the Ahmadnagar water supply problems in water treatment.

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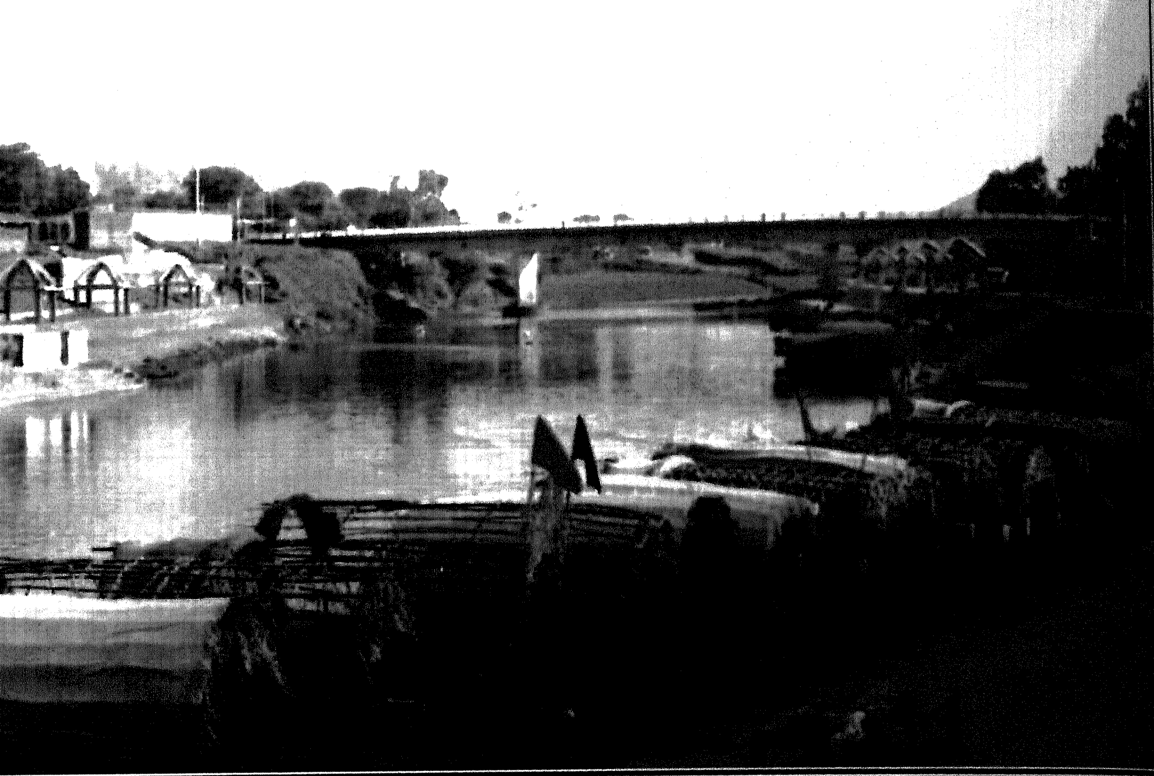
Imura et. al. (2005) studied the Japan's envioumnental policy. Kyessi (2005) reported the community based urban water management in Fringe neighbourhoods. Madhu et. al. (2005) investigated the effect of fluoride on growth of fingerlings of Chann Punctatus. Algre et. al. (2005) studied the performance indicators for water supply.

All these studies evidently showed that the effects of all the pollution sources on river water are severe and these lotic components need to be hydrobiologically monitored.

METHODOLOGY



Station P_1 - Ramghat

Station P_1 - Ramghat (Shows discharge)

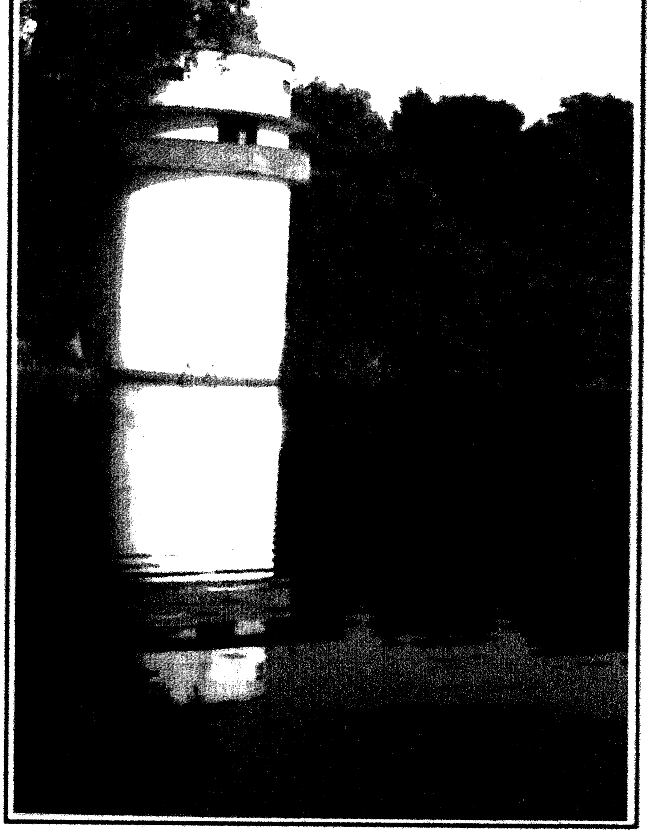
METHODOLOGY

The present study was carried out on river Paisuni, the streatch of the river is from Ramghtat to Kankota village of Rajapur, Karvi district of Uttar Pradesh. The study was carried out for a period of twenty four months (Jan., 2005 to Dec., 2006). As regard the characteristics of this river water in reference to its physico-chemical and biological factors. Obviously both the chracteristics of take various abiotic and biotic were studied for which the parameters are taken viz. colour of the water, water current, turbidity, water temperature, pH, CO_3, HCO_3, CO_2, total alkalinity, chloride, shulphate, phosphate, D.O., B.O.D., C.O.D. Ammonical Nitrogen, Nitrite, Nitrate, Total hardness. Flouride, Phytoplankton, Zooplankton, Aquatic weeds, Total coliform (M.P.N.) besides economically important fishes were also examined. The standred method for the analysis of this river water were adopted as for A.P.H.A., 1998 the proper assessement of the quality of this river water.

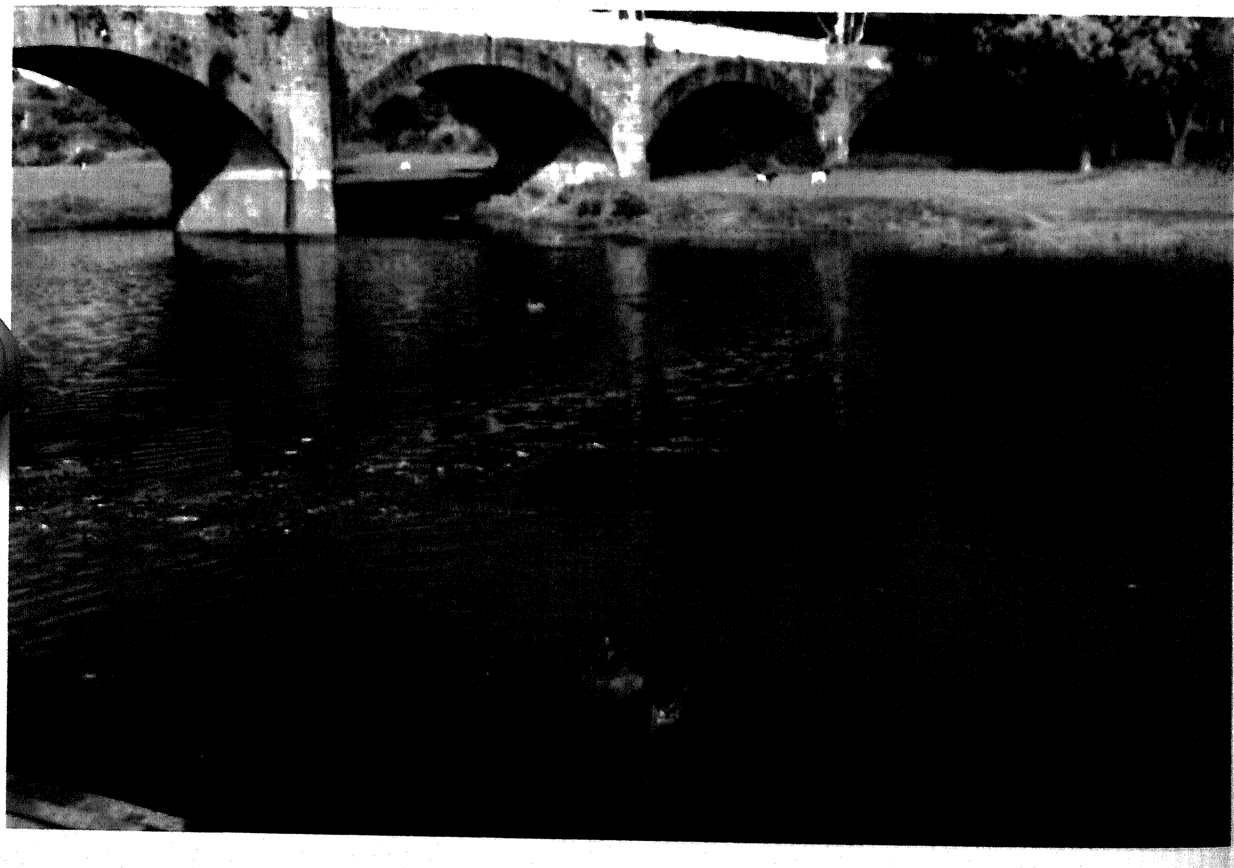
As the river under present study is a holy one, because frequently and espasialy on each Amavasya the people take dip in it therefore it is quite assential to assess the nature of this river. In the welfare of humen beings.

Having in view the entire ecology of this river five sampling station were selected at different places. Station P_1- Ramghat, station P_2 Patha inlet, station P_3 Patha outlet station P_4 Kalvaliya, station P_5- Kankota.

Station P_1 Ramghat- At the Junction of Mandakani, dudhaganga and Paisuni, which is Raghav Prayag Sangam, there pious ghat named on Shri Ramchandraji, the ghat is known as Ramghat, therefore it is a important sight for take dip espasialy at the auspicious occassions paticularaly at Amavasya. Obviously It is the fish ghat from where the river Paisuni starts. But at present it has been polluted by the discharge of at its apex. Various, drains and domestic wastes are also thrown there. The river flows south to north direction.



Station P_2 - Patha Inlet



Station P_3 - Patha Outlet

Station P_2 Patha inlet- It is located on the eastern bank of the river a few destence away from the Karvi road bridge and is on up stream, and approximately at a destence of 8 Kms. from station P_1. Topographycaly on the western bank of the river is a Shiv temple where some people take on the ghat bath and also use detergentes for washing their clothes. This is an inlet for feeding Patha water works, for the water supply of the small towns. The river flow is same as station P_1.

Station P_3 Patha outlet- It's location is on the eastern bank of the river near Karvi road bridge on upstream. The descharges of the Patha water works at this point obviously, it is the outlet. Besides this discharge on the down stearm. The criametason of dead bodies is done, thus range of water is highly polluted. Besides the run off from the coltivated land make the water more conteminated.

Station P_4 Kalvaliya- It is near Kalvaliya Village. The descharges of this village as well as of its Pravious reach in the river and also jain the Gaduaw nala therefore it makes the water polluted. At this spot the river becomes narrow and also shallow. Durning the rain the leaching of caltivated land Besides. cattle activities are also there. This station is also polluted.

Station P_5 Kankota- The river Paisuni state way confluence with the river Yamuna at this station, which is named on the name of village Kankota. It's comes under town Rajapur which is wall known due to Sant Tulsi Das birth place. The addjoing area of this station is marshy which is due to small Tuty river and Halica Nala. This site is away 14.6Km. from station P_4. The entire stratch of the river flow is south to north direction.

Water Sampling

Water samples from all the five stations of river Paisuni were collected monthly consistently for the period of two years (Jan., 2005 to Dec., 2006). As

Station P_4 - Kalvaliya

Station P_5 - Kankota

regards the testing of Physico-chemical and Biological factors. Sampling was performed preferably in the 4th week of month between 10am. to 5pm. Parameters were followed as per standard methods APHA (1998).

Samples for physico-chemical analysis were collected in good quality and property cleaned white plastic canes. This surface and subsurface water was collected for the study samples for dissolved oxygen were collected separately in stralized D.O. bottles. As D.O. changes vary repedily therefore it was fixed on the site by means of 1ml. maganese sulphate (MnoSo4) and 1ml. alkoli iodized solution on the spot. Temperature, pH and were determined at site. The sample were brought to laboratory for further investigation. The analysis was done before 6 Hrs. of the collected.

Samples for bacteriological analysis was taken in 125ml. sterile glass bottle having flat glass stopper and sterile paper on the neck of the bottles. For this analysis sampling site were disinfected by flaming and samples were collected as per standard procedüe. After sampling, samples were transported to the laboratory and inoculated with in 6 Hrs. of time.

The study was broadly divided in the fallowing sections:-

1. **Meterological Conditions**- Atmospheric temperature, Rainfall, Relative humidity, photo period .

2. **Physical factors-** Colcur of the water, water current, Turbidity, water temperature.

3. **Chemical Factors-** Hydragoen Ion - concentration (pH). Total alkalnity, Carbonates (CO_3), Bicarbonates (HCO_3), Disolved oxygen (D.O.), Carbon-di-oxide (CO_2), Biological oxygen demand (B.O.D.), Chemical oxygen

demand (C.O.D.), Ammonical Nitrogen (NH_4-N), Nitrite (NO_2), Nitrate (NO_3), Chloride (Cl), Shulphate (SO_4), Phosphate (PO_4), Total Hardness (T.H.), Sodium (Na), Potassium (K) and Flooride (F).

4. **Biological Factors**- Micro Flora and Macro Flora- Phytoplankton and aquatic weeds. Micro Fana and Macro Fana- Zooplankton and fishes. Total Coliform (M.P.N.).

Analysis Techniques

Physical characteristics

Colour of the water- The colour of river water was judged by visual observation.

Water Current (Flow-rate)- A tenis ball was thrown in water at a fixed point and the travelling time for a fixed distance was also noted. This exercise was repeated and mean flora rate was determined. The Flow rate was calculated as under :-

Flow rate (Cm. Sec^{-1}) = B - A/t

A = Starting point of the tenis ball.

B = That point of tenis ball travelled.

t = Time.

Water Temperature

The temperature of water was recorded at the time of sampling by a mercury thermameter graduated up to an accuracy of 0.5°C., the measurement range was from 0° to 50°C.

Turbidity

The turbidity of water was recorded by a systronics Nephloturbidity meter and expressed in NTU

Chemical Characteristics-

Hydrogen-ion-concentration (pH)- Took the sample from sample bottle in beaker dip the pH meter bulb in water until a constant reading is attained 4-5 minutes.

Total alkalinity (T.A.)

Reagent

(a) 0.02N (N/50 Sulphuric acid)

26.7ml of of sulphuric acid (H_2SO_4) was made to one litre with distilled water and standerised against 1N sodiam carbonate (Na_2CO_3) solution 0.02N (N/50) H_2SO_4 was prepored by making the calculated amount of standardised solution of sulphuric acid (H_2SO_4) to one litre with distilled water.

(b) Standard 0.01N (N/50) Na_2CO_3

To make 0.1N Na_2CO_3 stock solution 5.3gm. anhydrous Na_2CO_3 was carefully dessicated and dissolved in one litre of distilled water 0.02N (N/50) Na_2CO_3 was prepored from the stock solution (0.1N, Na_2CO_3) dilluting it to 250ml.

(c) Phenolphthalein (Indicator)

50mg. of phenolphthalein indicated was dissolved in 100ml of 50% alcohal.

(d) Methyl orange (Indicatar)

50mg. of methyl orange indicater was dissolved in 100ml. of distilled water.

Procedure

Carbonate alkalinity (CO_3)

50ml. of the sample taken in a conical flask add 20drops of phenolphthalein indicator. If the sample remains colourless carbonate alkalinity is present, it is turn pink titratewith 0.02N, H_2SO_4 until the pink colour disappears and note down the end point reading.

Calculation

ppm of $CaCO_3$ = No. of 0.02 NH_2SO_4 x 20

Bicarbonate alkalinity (HCO_3)- The bicarbonate (Mo) alkalinity was determined by the procedure (vide supra) but with methl orange, as in dicator. The colour of the sample changes from yellow to faint orange that is the end point.

Calculation

Mo alkalinity (ppm) -No of ml of .02 NH_2SO_4 x 20

Total Hardness (T.H.)-

Procedure-

Total hardness was determined titrimetrically using EDTA method (APHA, 1998), took 50ml of sample in a conical flask, one ml of ammonia buffer and a pinch of "Eriochrome black T" indicator was added and fitrated against EDTA (Ethyl diamine tetra acetic acid) till colour changes from purple to blue.

Reaction- M^{2+} + EDTA → (M.EDTA) Complex

M^{2+} Eriochrome black T → M. Eriochrome black T (wine red) complex

Where M^{2+} = Ca^{2+} and other divalent metal ions causing hardness.

Calculation-

Total Hardness (ppm) = A x 1000/Vol. of sample

Where A = ml of tirrant used.

Chloride (Cl)- Chlorine was estimated as chlorides (mohr s method A.P.H.A.)

procedure -100 ml of the sample water was titrated with N /35.5 silver nitrate ,using 5% potassium chromate $k_2Cr_2O_4$ as indicator . The end point comes when brick red colour appears.

Calculations-

Chloride (ppm) = No. of ml. of N/35.5 $AgNO_3$ used x 10

Dissolved- oxygen (D.O) - (wrinkler's method)

Reagents -

(a) Maganous Sulphate -480 gm of $MnSO_4$ H_2O dissolved in distilled water and made up to 1 litre.

(b) Alkaline Iodine - 500 gm of NaOH and 150gm KI- (sodium hydroxide) potassium iodide in distilled water and add 20gm of sodium-azide and make up to 1 litre

(c) Concentrate sulphuric acid.

(d) Starch Solution -Make an emulsion 2 gm of starch in distilled water add this emuleion with 350 ml of boiling water in conical flask.

(e) standard sodium thiosulphate (N/80) -24.82gram of $Na_2S_2O_3$ dissolved indistilled water and diluted to 1 litre of distilled water. It gives 0.1N $Na_2S_2O_2$ standardise thid solution with 0.1 N K_2 cr_2 O_7andardise this solution with 0.1N $k_2S_2O_3$ solution 64.904 gm dissolved in 1 litre. 125 ml of this solution diluted to 1 litre gives N/80 $Na_2S_2O_3$.

Procedure - carefully removed the stoper of D.O botlle and add 2ml of cone. H_2SO_4 of the solution and titrated with standard thiosulphate N/80 to place yellow colour. Add 1to2 drop of freshly prepared starch solution and continued the titration to the firsh disappearance of blue colour.

Calculation-

$$D.O\ (ppm) = \frac{1000 \times \text{No.of ml } Na_2S_2O_3}{\text{Volume of sample}}$$

Biochemical Oxygen Demand (B.O.D.)

Biochemical oxygen demand (B.O.D) gives an idea about the extent of pollution. For Biochemical oxygen Demond method from work book on limnology was adopted B.O.D was estimated by incubating the sample in B.O.D. incubator for 5days at 20°c and after 5days dissoloved oxygen was fixed and estimated. Difference of initial D_0 and final D_5 gave the total biochemical oxygen demond.

Calculation -

B.O.D. in mg /l $= D_0 - D_5 / v$

where,

D_0 =initial dissolved oxygen

D_5 =D.O. calculated after 5 days

V = Decimal Volumetric fraction of sample used .

Chemical Oxygen Demand (C.O.D.)

Chemical Oxygen Demand (C.O.D) was determined by potassium Dichromate Reflux method (NEERI,1986) 20ml of sample water was taken in a 200ml flask .the 10 ml of 0.25 N potassium dichromate, 30ml of conc. sulphuric acid, a pinch of silver sulphate and mercuric sulphate were added and refluxed for two hours in a water bath . After two hours distilled water was added to make its volume 140 ml .2 to 3 drops of ferroin indicator was added to refluxed sample , mixed thoroughly and treated with 0.25 N ferrous.Ammonium Sulphate till a brick red colour end point is obtained. Ablank was done with distilled water.

Reaction -

$2k_2cr_2o_7 + 8H_2So_4 \rightarrow 2K_2(So_4)_3 + 2Cr_2(So_4)_3 + 8H_2O + 3O_2$

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

$Cr_2O_7^{2-} + 6Cl + 14H^+ \rightarrow 3Cl_2 + Cr^{+3} + 7H_2O$

$Hg^{+2} + 2Cl^- \rightarrow HgCl_2$

Calculation-

C.O.D in mg /l =(A-B) x N x 8000/Volume of sample (inml)

Where ,

A= ml of titrant used with sample

B=ml of titrant used with blank

N=Normality of $FeSo_4 (NH_4)_2So_4.6H_2O$

Ammonical nitrogen (NH_4-N)

Ammonical nitrogen (NH_3 -N) was estimated by visual comprison of direct Nesslerization method.

Procedure-

Placed 50ml. of water sample in a Kjeldahl distillation flask. Added approximately 0.5gm. magnesium oxide followed by 50ml of ammonia free distilled water and distilled in Kjeldahl distillation unit, collected 40ml of the distillate. After making it 50ml place it in a Nesseler's tube. This gives the ammonia present in the sample (A) to know the amount of nitrate cool at the distillation flask after ammonia distilation add small amount of devards allog to the contents of the flask followed by 50ml. of ammonia free distilled water. Distilled the mixture in the similar way. Nitrate is reduced to ammonia by the devard's alloy. Collected 40ml. of distillate make up to 50ml and keep it in the Nessler's tube. This gives the nitrate present B.

Prepared a number of different nitrogen content from the standard solution. Add 1ml of Nessler's reagent to each and also to the two distillates (NH_3 and NO_3). Match the colour of both ammonia distillate (A) and nitrate distillate (B) with the colour of the standards.

Calculation- Ammonical nitrogen (ppm)

= No. of ml. of standard for (A) x 0.1 x 20

Nitrite Nitrogen (NO_2-N)

Procedure- 1ml. of each, sulfanilic acid naphthyl-amine Hdrochloride and sodium Acetute solutions in sequence were added in 50ml. of colour less filtered sample. Awine red colour of nitrite oppeared and determined at 520nm coave length and the value of NO_2-N was culculated in mg/l. directly from standard curve.

Nitrate Nitrogen (NO_3-N)

Procedure-- Phenol disulphonikc acid method was chosen for this parameter 50 ml of water sample was evaprated in water bath. Residue was dissolved in 1,2,4,phemol disulphonic acid. On addition of ummonia solution. Yellow colour alkaline salt was formed and determined at 510 nm, wave length. Value of NO_3-N in mg /l was found out by standard curve.

Phosphate (PO_4)-

The phosphates were estimated by stannous chloride methods.

Reagents-

a) Ammonium molybdate (acidified)

b) Stannous chloride.

c) Standard phosphate solution (KH_2PO_4)

Procedure-

A series of temporary standards of phosphates were prepared by adding known volumes 0.2, 0.4, 0.6, 0.8, 1.0 and 1.2ml of standard phosphate solution in the Nessler's tubes by adding 4ml molybdate reagent and 1ml stannous chloride reagent with through mixing. 50ml sample was taken and added 4ml. molybdate reagent add 1ml. stannous chloride solution. The colour so developed was matched with the standards.

Calculation-

$$\text{Phosphate (ppm)} = \text{No. of ml of } KH_2PO_4 \; \frac{\text{Standard used} \times 1000}{\text{Volume of samples}}$$

Sulphate (SO_4)

40ml water sample was taken into 100 ml cylinders , followed by 10 ml Barium chloride solution . The sample was shaken and kept standing for 15 min . The reading of developed turbidity was measured on uv-vs spectrometer at 420 mm. The concentration of sulphate was calculated by satandard curve Results were expressed in mg./litre .

Sodium (Na)

Sodium determination was carried out by using systronics make flame photometer .The instrument was calibrated with standard sodium chloride dolution. Than the sample was sprayed into gas flame and the excilation was measured at 589 nm.

Potassium (K)

Potassium determination was carried out by using flame photometer. The instrument was calibrated with standard solution of Potassium chloride. The Potassium determination was carried out 768nm.

Free -carbon-di-oxide (CO_2)

Reagents (a) N/44 sodium hydroxide solution 4 gm of A.R. quality NaoH is dissolved in 1litre of distilled water ,which gives 0.1N NaoH. Standarise this solution with 0.1 NH_2So_4 using phenolophthalein indicator.100ml of this solution diluted to 440ml gives N/44NaoH.

Procedure - Took 50ml of water sample in a conical flask add 2 drops of phenolphthalein indicator If the colour of water turned pink there show the absence of free Co_2, on the other hand if remained colourless the free carbon-di-oxide was present .If the free carbon -dioxide was present then the solution was titrated with N /44 sodium hydroxide solution till adistinct pink colour developed ,which flashed for a few seconds throughout the solution ,volume of the titrant used was noted and CO_2 estimated.

Calculation

CO_2 (ppm)=No of ml of N /44 NaoH required x 20

Floûride (F)

Spands Method-

Reagents required.

a) **Stock Floûride standard solution-**

(100mg./l.) Dissolve 0.22/g previously dried (105°C.) sodium floûride in 100ml of distilled water.

(b) **Spands Reagents-**

i) Dissolve 0.95gm. spands in 500ml. of distilled water.

ii) Dissolve 133mg. zirconyl chloride octabydrate in 25ml. of distilled water

add 350ml. conc. HCl and dilute to 500ml.

Mix both the reagents in equal proportion.

(c) **Reference solution**- Add 10ml of spands solution to 100ml of distilled water dilute 7ml of conc HCl to 10ml and add to the diluted spandns solution. The resulting solution is used for selting the instrument reference point (Zero).

Procedure

1. Preparation of standard curve- Prepare flouride standards in the range of 0 to 1.40mg./l. by diluting appropriate quantities of standard flouride solution with distilled water pipet 10ml. mixed acid zirconyl-spandns regent to each standard and mix well. Set spectrophotometer to zero absorbance with the reference solution and obtain absorbance readings of standards. Plots a curve of the mg. flouride absorbance relationship.

2. Took 50ml. sample and adjust the sample temperature to that used for the standard curve. Add 10ml. acid zirconyl spadns reagent mix well and read absorbance (wavelength of 570nm), first selting the reference point of the spectrophotometer. It the absorbance falls beyond to range of the standard curve, repeat using a diluted sample. Also prepare the black solution.

Biological Characteristics

Analysis technique

Plankton

The phyto and zooplankton were collected by mean of plankton net (welch 948) and preserved at the site. The bolting silk No. 25 (65n) was used in the net, which is attached with an iron ring of about 20cm. diameter in conical shape. The open tail side is about 2-3 an in dia meter was tied firmly to a glass tube measuring 5cm. in length and 2cm. in dia meter. In each collection 100litres of surface water was collected by means of a jug, which was filtered through the plankton net. The filtrate this contains plankton (phyto and zooplankton) 10ml. of the filterate was preserved in 4% for malin at the spot. The quantitative and qualitative examination

was done in the laboratary by the standard methods (A.P.H.A., 1985 18th Ed.) and Goyal and Trivedi, 1986.

Before analysis each plankton sample was diluted and mixed with water to make it to 50ml., 1ml. of this sub sample was drawn quickly with a wide mouthed pipette and poured into a sedge wick-Rafter plankton counting cell. All the organisms were identified upto genus level. Analysis of each genus was then calculated as No./litre of the water by the formula given by welch's (1948).

$$n = \frac{(a \times 100)\ c}{1}$$

Where,

n = Number of plankton per litre.

a = Average number of plankton in all count in a counting cell.

c = Volume of original concentration filtered in ml.

1 = Volume of original water expressed in litre.

Total Coliform (MPN)-

Water samples were collected separately for determination of Bacteriologicall analysis, water samples collected in sterile sample bottles were transported to the laboratory in ice box and minimum elapsed time between collection and analysis in no case did exceed 30 hours. Bacteriological analysis consisted of standard plate count presumptive and confirmatory tests for coliform and MPN of total coliform.

Multiple tube technique was adopted for the estimation of the number of presumptive total coliform (MPN count) present in a given volume of water by inoculation of appropriate volume into a number of tubes of medium (Mc. conkeys broth) 10ml., 1.0ml. of sample in oculated in the three sets of stest tabes, each containing 10.0m of medium placed within 30minutes all these tubes in incubator at 35-37°C. After 43 hours each tube was examined carefully. Those showing gas in the duraham's vial was recorded as positive (+).

$$\text{MPN/100ml.} = \frac{\text{No. of Positive tube x 100}}{\sqrt{\dfrac{\text{Total sample (ml.) in Negative tube}}{\text{Total sample in test}}}}$$

Fishes

The fishes were collected during night or early in the morning by line and bait method and also with vertical nets (100 x 5') with a mesh (3' x 5') in dia meter and its identified with the help of francis Day fauna.

Aquatic weeds

The samples of aquatic weeds were collected and their abundance was assessed by visual observations and identified up to species level according to Hooker (1872-1997) and subramanyam (1962).

Meteorological date are recorded for the period of two years i.e. (2005-2006) from collectrate office at Karvi and their means values were calculated.

OBSERVATION

OBSERVATION

The Physico-chemical and biological analysis of the river Paisuni water done for the study period of two years (from Jan., 2005 - Dec., 2006) as per the standard method given in APHA the investigation were recorded as monthly fluctuations their average values Co-efficient Co-relation and standard deviation they all are tabulated . The various factors under the present study are.

Physical factors- Water temperature, colour, turbidity water current.

Chemical factors-pH, Co_3, HCO_3, T.A., T.H., Cl, D.O., B.O.D., C.O.D. NH_4-N, NO_2-N, NO_3-N, PO_4, SO_4, Na, K, Free Co_2, F.

Biological factors- Phytoplankton, Zooplankton, M.P.N., aquatic weeds and fishes.

Besides meteorological conditions which is direct impact on the above factors.

Meteorological conditions

Atmospheric temperature, rainfall, humidity and photoperiod, their monthly mean values. They were recorded during the period of two years of study.

Atmospheric Temperature

In the first year of the investigations were recorded (from Jan., 2005 to Dec., 2005) it varied from 8.90°C. to 41.50°C. and in Jan., 2006 to Dec., 2006 ranged between 8.70 to 41.94°C.. The lowest atmospheric temperature was recorded in the month of winter season i.e. Jan. in both the years whereas highest value was observed in the month of summer season i.e. April in first year and in the second year in the month of June (Table-1 & 2) it was observed that atmospheric temperature increases when the photoperiod increase.

Rainfall

In the first year (Jan., 2005 to Dec., 2005) it varied from 7.00mm. to 368.88m.m. and in second year (Jan., 2006 to Dec., 2006) it ranged between 1.4m.m. to 392.80mm. Lowest rainfall was recorded in the month of Feb., and the highest was observed in July in both the years where as in the month of Jan., April, Oct. and Nov. in the year of 2005 rainfall was nil and in the months of Jan., April, May, Nov. & Dec. in the year of 2006 rainfall was also nil (table-1 & 2). It was noticed that highest rainfall depend upon monsoon.

Relative Humidity

It varied from 20.20% to 81.10% during 2005 and in 2006 ranged between 16.18%, 79.14%. The lowest humidity was recorded in April while the highest was observed in August in the year of 2005 and in year 2006 the lowest humidity was recorded in May while the highest was observed in August (table-1 & 2). It is effected by rainfall and atmospheric temperature.

Photoperiod

It varied between 10.13 hrs. and 13.33 hrs. in 2005 and in the year 2006 ranged between 10.12 hrs. to 13.32hrs. Lowest photoperiod was recorded in Jan., while the highest was observed in June in both the years (table-1 & 2).

Physical Factors

During the present study water temperature, turbidity water current and colour were observed (table 3 to 27).

Water Temperature

The water temperature varied from 17.00^{0}C. to 36.30^{0}C. in 2005 and between 17.10^{0}C. to 35.70^{0}C. in the year 2006 at the selected sampling stations. The lowest temperature of water was recorded in winter months i.e. Dec., and January in 2005 and 2006 respectively while the highest value was recorded in

summer months i.e. May and June in 2005 and 2006. It showed direct impact of atmospheric temperature (table 3 to 27).

Turbidity

The range of variation was observed from 1.90 to 8.0 N.T.U. in 2005 and 2.0 to 8.10 N.T.U. in 2006. The maximum turbidity was observed in the month of August. Higher values of the turbidity were recorded in rainy season and summer season due to silting and decomposition of organic wastes, run.off and wind velocity (table 3 to 27).

Water Current

It varied from 20.80 to 1160.56cum./second in 2005 and 20.90 to 1035.40 cum./Sec. in 2006. The water current was maximum during rainy season that is either in the month of August or September at various stations but the minimum water current was recorded in summer season (table 3 to 27).

Colour

The colour of water varied from muddy greenish and transparent. Muddy colour of the water observed in the month of July and August, greenish colour of the water was noticed in the month of September, October, May and June whereas transparent colour was found in the month of November, December, January, FEbruary, March and April in both the years colour of the water depend on growth of phytoplankton, Algae and turbidity.

Transparency

The transparency was found to vary from high to low in months of May, June, July and Oct. was high and in Jan., Dec., Aug. and Sept. the low transparency was found, while the medium transparency was in the months of Feb., Mar., April & Nov., in both the years.

Chemical Factors

pH, CO_3, HCO_3, T.A., T.H., Cl, D.O., B.O.D., C.O.D., NH_4-N, NO_2-N, PO_4, SO_4, Na, K, free Co_2, F, which are taken in the present study to analyse the chemical nature of the Paisuni River water.

Hydrogen-ion-concentration (pH)

During the investigation pH of river water was observed between 7.00 to 8.96 in the year 2005 and in 2006 it ranged between 7.20 to 8.95. This water was found alkaline throughout the period of study. The variation in the pH at all the stations was not only irregular during different seasons but it showed altogether different trend at certain stations.. It was noticed that Co_2 concentration plays an important role in the fluctuation of pH (table 3 to 27).

Carbonates (CO_3)

The range of variation in the carbonate of river water was noted from 14.00ppm to 27.00ppm in the year of 2005 and in 2006 it ranged between 13.00ppm to 28.00ppm (table 3 to 27).

Bicarbonates (HCO_3)

The range of variation in the bicarbonate of river water was noted from 142.00ppm to 173.00ppm in the year of 2005 and in 2006 it ranged between 140.00ppm. to 176.00ppm (table 3 to 27).

Total Alkalinity (T.A.)

During the investigation period the value of alkalinity varied from 167.00ppm. to 190.00ppm. in 2005 whereas in 2006 it ranged between 162.00ppm to 193.00ppm. It was noticed that pH and hardness of water positively affect this factor (table 3 to 27).

Total Hardness (T.H.)

During the study period of 2005 it ranged between 150.00ppm. to 282.00ppm. and in 2006 varied from 155.00ppm. to 284.00ppm. The maximum avarage of this factor was found in the month of May while minimum value was recorded in the month of August during the entire period of study. It particularly reveals the nature of water. It was marked that alkalinity of river water directly affects this factor (table 3 to 27).

Chlorides (Cl)

The chloride in river water was found to vary from 16.00ppm. to 35.32ppm. in the year of 2005 and in 2006 it ranged between. 15.00ppm. to 35.30ppm.. The minimum average value was recorded in the month of February and maximum value was recorded in the month of July in both the years of study. High concentration of chloride is caused by decomposition of organic wastes of animals, which is the indicator of water pollution (table 3 to 27).

Dissolved oxygen (D.O.)

It is a very important parameter of water quality in the study period it was found 5.9ppm. to 9.09ppm. in the first year and in second year ranged between 5.03ppm. to 9.07ppm. The oxygen was found to be higher in winter season and lower in rainy and summer seasons during both the years. It was found that D.O. concentration was affected by the concentration of animal excreta (table 3 to 27).

Biochemical Oxygen Demand (B.O.D.)

In the study period it varied from 0.9ppm. to 2.29ppm. in 2005 and in 2006 it ranged between 1.00ppm. to 2.40ppm. The maximum value was found in the month of June whereas minimum value was recorded in the month of January during entire study period. It determines the strength of pollution of sewage in water. It is the amount of oxygen required to degrade the organic and chemical wastes until

the water again purifed. It is observed that B.O.D. is directly related with chloride and C.O.D (table 3 to 27).

Chemical Oxygen Demand (C.O.D.)

During the observation river water C.O.D. values varied between 12.50 to 15.99ppm. The minimum value 12.50ppm. was observed in the month of January 2005 and the maximum value 15.99ppm. was also found in the year of 2005. It is observed that C.O.D. is always greater than B.O.D. values. A direct relationship was observed between B.O.D. and C.O.D. Toxicity of water was found responsible for these factors. The C.O.D. test is helpful in indicating toxic condition (table 3 to 27).

Ammonical Nitrogen (NH_4-N)

In the present findings ammonical nitrogen varied between 0.04 to 0.06ppm. in the year 2005 while tin the year 2006 the range of ammonical nitrogen varied between 0.03 to 0.07ppm. The minimum concentration was found in August in 2005 whereas maximum concentration was noticed in the month of April in the year 2005. The increase trend was noticed in summer and post monsoon period. Sewage has large quantities of nitrogenous matter, which increases ammonia contents of the water and enhances Ammonical Nitrogen. It is an indicator of water pollution (table 3 to 27).

Nitrite (NO_2-N)

During the present study period it varied between 0.06ppm. to 0.09ppm. in the year 2005 while in the year 2006 the range of Nitrite varied between 0.06ppm. to 0.09ppm. It is found in a very low concentration in natural waters (table 3 to 27).

Nitrate (NO_3-N)

In the study period it was found 0.10ppm. to 0.59ppm. in 2005 and in 2006 ranged between 0.10ppm. to 0.58ppm. Nitrate which is commonly present in natural

water is the most highly oxidized form of nitrogen compounds. It plays an important role in eutrophication of water alongwith phosphates (table 3 to 27).

Phosphate (PO_4)

It is observed that considerable irregular increases in the concentration of phosphate indicates the presence of pollutants. In present findings the concentration of river water was found in the range of 0.13 to 0.42ppm. in year 2005 and in 2006 varied from 0.15 to 0.42ppm. The maximum average value was recorded in the month of July while minimum value was found in the month of December in both the years. It's higher concentration was found in rainy months due to leaching (table 3 to 27).

Sulphate (SO_4)

In present study sulphate content was observed in the range of 11.30 to 32.41ppm. in 2005, while in 2006 it was found in the range of 12.00 to 31.41ppm. The minimum concentration was found in winter season and maximum concentration was noticed in the summer season (June) in both the years. It's concentration is effected by domestic sewage. It's determination in polluted water is important because it is directly associated with odour and corrosion problems (table 3 to 27).

Sodium (Na)

In the present study the concentration of sodium was found in the range of 30.00 to 48.00ppm. in the first year while in the second year the sodium content fluctuated between 30.00 to 45.00ppm. The minimum value was observed in the month of December and the maximum value was noticed in the month of August in the study period (table 3 to 27).

Potassium (K)

In the present investigation in river water potassium value varied between

0.29 to 9.00ppm. in the year 2005 and in year 2006 varied from 0.30 to 9.00ppm. The minimum value was observed in the month of January and the maximum value was observed in the month of August throughout the study period (table 3 to 27).

Carbon-di-oxide (CO_2)

In the first year 2005 it ranged from 12.10 to 18.70ppm. and in the second year 2006 from 11.00 to 18.80ppm. D.O. is ill effected by CO_2 (table 3 to 27).

Fluoride (F)

The range of variation in the fluoride was observed from 0.12 to 0.83ppm in the year 2005 while in the year 2006 it was found 0.13ppm. to 0.82ppm. The minimum value was found in January and the maximum value was found in October in both the years (table 3 to 27).

Total Colifrom (MPN)

In the present investigation the total colifrom was observed from 60 to 2000/100ml in the year 2005 while in 2006 it varied from 55 to 2000/100ml. The minimum value of MPN was found in the month of January and maximum value was noticed in the month of August during the period of study (table 3 to 27).

At all the stations higher range of MPN was noticed during summer and monsoon seasons. It's range was found to be effected by organic matter decomposition in monsoon and summer seasons.

Table-1

Meteorological Data

Monthly Avarage for the Year 2005

S.No.	Month	Atmosperic temperature		Relative humidity %		Rain fall	Photo peric
		Max. ^{0}C.	Min. ^{0}C.	Morning	Evening	MM.	Hrs
1	January	23.82	8.90	32.19	25.14	0.00	10.13
2	February	27.50	11.52	40.02	27.56	7.00	11.08
2	March	38.00	17.23	30.17	22.10	23.80	11.15
4	April	41.50	23.18	37.81	26.14	0.00	12.20
5	May	40.36	28.91	33.82	22.32	26.00	13.01
6	June	39.93	29.40	32.96	20.20	154.00	13.33
7	July	38.82	28.13	46.67	29.10	363.88	13.24
8	August	33.54	24.90	81.10	68.08	78.00	13.11
9	September	32.45	24.32	54.56	32.18	201.00	12.93
10	October	31.16	20.11	46.67	20.12	0.00	10.90
11	November	28.33	16.26	44.32	27.57	0.00	11.15
12	December	23.51	10.35	32.20	24.20	21.40	11.31

Table-2

Meteorological Data
Monthly Avarage for the Year 2006

S.No.	Month	Atmosperic temperature		Relative humidity %		Rain fall	Photo period
		Max. ^{0}C.	Min. ^{0}C.	Morning	Evening	MM.	Hrs
1	January	18.30	18.70	54.56	32.51	0.00	10.12
2	February	23.95	17.94	52.46	30.14	1.40	11.20
2	March	33.12	17.11	40.01	28.12	20.00	11.80
4	April	38.93	23.33	35.14	27.65	0.00	13.23
5	May	41.26	26.12	30.16	16.18	0.00	13.14
6	June	41.94	28.74	55.04	34.47	39.00	13.32
7	July	35.18	29.56	65.56	55.08	392.80	13.24
8	August	34.17	27.60	79.14	59.42	231.00	13.10
9	September	33.00	25.87	55.21	36.18	215.40	12.62
10	October	29.22	21.40	51.22	30.16	70.00	11.27
11	November	27.43	18.63	49.65	27.01	0.00	11.12
12	December	24.60	11.21	40.45	26.34	0.00	11.32

Table- 3

Physico-chemical Characteristics of River Paisuni

Station-P_1 | Period - 2005

Month	W. Temp. ^0C.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
Jan	17.00	3.00	26.40	7.99	26.00	145.00	171.00	187.00	18.40	9.00	0.90	12.50	0.04	0.06	0.21	0.15	12.10	32.00	0.28	14.80	0.12	60.80
Feb	22.20	3.25	45.00	8.00	23.00	149.00	173.00	190.00	15.90	8.42	1.40	13.01	0.04	0.06	0.25	0.20	11.80	31.00	1.00	15.30	0.20	86.00
Mar	24.50	3.20	48.40	7.91	18.00	153.00	171.00	250.00	17.50	6.20	2.00	13.45	0.05	0.07	0.28	0.18	11.30	33.00	2.00	16.60	0.43	120.00
Apr	26.90	3.50	18.60	8.10	17.00	156.00	173.00	268.00	20.21	6.00	2.10	14.90	0.05	0.07	0.35	0.19	20.90	32.00	3.00	18.10	0.46	174.00
May	34.30	4.00	30.40	8.40	17.00	157.00	174.00	282.00	26.20	6.00	2.12	15.01	0.05	0.07	0.59	0.21	25.20	34.00	4.00	12.70	0.51	185.00
Jun	35.00	4.20	102.80	8.50	14.00	170.00	184.00	271.00	31.51	5.90	2.25'	15.98	0.06	0.08	0.35	0.26	29.30	35.00	5.00	14.20	0.62	276.00
Jul	29.20	5.10	705.70	8.10	15.00	168.00	183.00	185.00	24.10	6.99	1.56	14.65	0.04	0.08	0.25	0.28	26.40	37.00	6.00	16.80	0.48	1500.00
Aug	29.00	3.50	1034.50	8.20	20.00	165.00	185.00	156.00	24.24	7.70	1.01	14.00	0.03	0.08	0.10	0.27	24.80	38.00	6.00	13.20	0.40	2000.00
Sep	30.10	3.45	500.80	8.00	18.00	156.00	174.00	165.00	26.42	6.80	1.80	15.60	0.04	0.08	0.12	0.25	19.20	35.00	4.00	17.80	0.50	1600.00
Oct	26.20	3.40	9.56	7.80	22.00	145.00	167.00	173.00	28.01	7.00	1.70	14.20	0.04	0.08	0.21	0.23	17.50	33.00	2.00	12.20	0.81	1300.00
Nov	21.50	4.12	40.70	8.00	25.00	142.00	167.00	193.00	23.25	7.90	1.55	13.00	0.04	0.07	0.39	0.21	13.30	34.00	1.00	13.90	0.22	194.00
Dec	20.10	5.00	20.80	8.10	26.00	144.00	170.00	190.00	20.21	8.60	1.12	12.98	0.04	0.07	0.22	0.16	12.90	33.00	1.00	13.50	0.30	102.00

Table- 4

Matrix Showing Correlation of Coefficient among various Physico-Chemical Parameters

Station-P_1 | Period - 2005

	W. Temp. ^oC.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
W.T.	1																					
Tur	0.01	1																				
W.C.	0.29	0.14	1																			
PH	0.01	0.00	0.04	1																		
CO_3	-0.06	-0.11	-0.28	-0.46	1																	
HCO_3	0.06	0.02	0.37	0.40	-0.53	1																
T.A.	0.02	0.01	0.28	0.26	-0.25	0.37	1															
T.H.	0.10	0.01	-0.47	0.53	-0.05	0.25	0.05	1														
Cl.	0.71	0.28	0.22	0.46	-0.47	0.46	0.36	0.10	1													
D.O.	0.05	0.00	0.01	-0.32	0.71	-0.47	-0.22	-0.56	-0.41	1												
B.O.D.	0.01	0.00	-0.31	0.34	-0.73	0.36	0.05	0.76	0.42	-0.91	1											
C.O.D.	0.10	0.02	0.18	0.40	-0.62	0.53	0.38	0.28	0.55	-0.59	0.52	1										
NH_4-N	0.31	0.00	-0.57	0.48	-0.36	0.16	0.00	0.82	0.13	-0.49	0.64	0.32	1									
NO_2-N	0.00	0.32	0.51	0.21	-0.37	0.45	0.42	-0.17	0.66	-0.30	0.11	0.50	-0.24	1								
NO3-N	0.00	0.20	-0.52	0.48	-0.26	0.02	-0.15	0.80	0.14	-0.46	0.60	0.20	0.73	-0.21	1							
PO_4	0.00	0.26	0.70	0.31	-0.61	0.72	0.69	-0.19	0.66	-0.38	0.22	0.63	-0.22	0.77	-0.16	1						
SO_4	0.06	0.36	0.49	0.73	-0.78	0.86	0.79	0.29	0.74	-0.60	0.41	0.81	0.23	0.72	0.22	0.76	1					
Na.	0.11	0.24	0.52	0.23	-0.27	0.42	0.44	-0.16	0.33	-0.13	-0.04	0.26	-0.25	0.49	-0.13	0.49	0.41	1				
K	0.07	0.32	0.76	0.56	-0.81	0.93	0.87	0.08	0.60	-0.56	0.30	0.75	-0.05	0.77	-0.03	0.87	0.91	0.85	1			
Free CO_2	0.00	-0.10	0.10	-0.16	-0.32	0.20	0.09	0.09	-0.28	-0.22	0.22	0.19	0.03	-0.18	-0.16	0.01	-0.04	-0.07	0.10	1		
F	0.01	0.09	0.08	0.13	-0.61	0.40	0.19	0.21	0.74	-0.72	0.61	0.73	0.20	0.70	0.08	0.54	0.57	0.29	0.51	-0.13	1	
MPN	0.28	0.06	0.86	-0.11	-0.28	0.44	0.47	-0.61	0.45	-0.08	-0.19	0.36	-0.69	0.79	-0.59	0.78	0.45	0.77	0.67	0.02	0.43	1

Table- 5

Physico-chemical Characteristics of River Paisuni

Station-P_2 | Period - 2005

Month	W. Temp. ^0C.	TUR. N.T.U.	W. C. Cum./Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
Jan	17.20	5.00	30.00	7.05	26.00	145.00	171.00	188.00	19.01	9.02	0.95	12.50	0.04	0.06	0.21	0.14	14.60	31.00	0.29	14.70	0.15	61.00
Feb	22.40	6.00	45.50	8.00	24.00	149.00	173.00	191.00	16.00	8.43	1.41	13.03	0.05	0.06	0.25	0.18	13.60	30.00	2.00	14.90	0.21	86.00
Mar	25.30	6.10	49.80	8.23	19.00	155.00	174.00	250.00	17.50	6.20	2.04	13.50	0.05	0.07	0.28	0.18	17.10	32.00	2.00	15.80	0.42	121.00
Apr	27.10	7.22	19.40	8.12	18.00	156.00	174.00	269.00	20.26	6.00	2.15	14.96	0.06	0.07	0.35	0.20	21.40	32.00	3.00	17.10	0.45	176.00
May	33.80	6.89	30.80	8.50	19.00	158.00	177.00	183.00	28.27	6.03	2.15	15.06	0.05	0.07	0.59	0.22	25.30	33.00	5.00	18.60	0.52	184.00
Jun	35.20	4.65	103.60	8.60	14.00	172.00	186.00	273.00	32.01	5.90	2.26	15.99	0.06	0.08	0.36	0.27	31.30	34.00	6.00	12.90	0.63	278.00
Jul	29.60	3.28	718.30	8.75	16.00	169.00	185.00	188.00	32.04	7.00	1.57	14.69	0.04	0.08	0.25	0.29	29.50	36.00	7.00	14.90	0.49	1110.00
Aug	29.40	1.90	1040.80	8.90	22.00	166.00	188.00	150.00	31.20	7.70	1.06	14.02	0.04	0.08	0.10	0.25	28.20	41.00	9.00	11.00	0.30	1803.00
Sep	30.60	2.32	501.00	8.96	19.00	156.00	175.00	164.00	26.31	6.90	1.82	15.63	0.04	0.08	0.12	0.23	25.70	36.00	8.00	15.40	0.50	602.00
Oct	26.90	3.46	98.90	8.80	23.00	146.00	169.00	176.00	27.06	7.01	1.75	14.22	0.04	0.08	0.21	0.23	22.40	32.00	6.00	13.10	0.80	305.00
Nov	22.00	4.78	41.60	8.60	26.00	143.00	169.00	197.00	30.34	7.90	1.56	13.10	0.04	0.07	0.39	0.22	20.80	33.00	4.00	12.90	0.31	196.00
Dec	20.40	4.10	21.70	7.10	27.00	145.00	172.00	192.00	24.01	8.70	1.20	13.00	0.04	0.07	0.22	0.17	18.10	31.00	2.00	12.30	0.30	104.00

Table- 6

Matrix Showing Correlation of Coefficient among various Physico-Chemical Parameters

Station-P_2 | Period - 2005

	W. Temp. ^{0}C.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O. D. p.p.m	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
W.T.	1																					
Tur.	-0.74	1																				
W.C.	0.35	-0.76	1																			
PH	0.54	-0.28	0.39	1																		
CO_3	-0.74	-0.06	-0.22	-0.49	1																	
HCO_3	0.50	-0.01	0.36	0.33	-0.53	1																
T.A.	0.27	-0.15	0.29	0.18	-0.27	0.38	1															
T.H.	0.14	0.57	0.47	-0.14	-0.45	0.21	0.03	1														
Cl.	0.56	-0.54	0.49	0.57	-0.30	0.50	0.55	-0.22	1													
D.O.	-0.67	-0.23	0.01	-0.48	0.70	-0.49	-0.28	0.04	-0.21	1												
B.O.D.	0.67	0.45	-0.32	0.43	-0.73	0.37	0.08	0.63	0.11	-0.91	1											
C.O.D.	0.67	-0.08	0.18	0.47	-0.62	0.52	0.38	0.19	0.37	-0.59	0.53	1										
NH_4-N	0.30	0.72	-0.53	-0.10	-0.44	0.21	0.03	0.19	-0.16	-0.56	0.67	0.36	1									
NO_2-N	0.53	-0.56	0.51	0.54	-0.35	0.45	0.45	0.76	0.69	-0.32	0.14	0.52	-0.18	1								
NO3-N	0.30	0.74	0.51	0.02	-0.25	0.05	-0.09	-0.18	0.11	-0.47	0.60	0.22	0.69	-0.19	1							
PO_4	0.76	-0.45	0.58	0.79	-0.64	0.73	0.69	0.41	0.81	-0.50	0.33	0.68	-0.03	0.78	0.04	1						
SO_4	0.84	-0.44	0.58	0.70	-0.69	0.80	0.76	-0.01	0.86	-0.56	0.36	0.79	0.06	0.86	0.08	0.91	1					
Na.	0.40	-0.52	0.70	0.48	-0.27	0.49	0.57	-0.28	0.50	-0.14	-0.09	0.31	-0.31	0.55	-0.26	0.51	0.55	1				
K	0.74	-0.69	0.78	0.86	-0.47	0.63	0.64	-0.37	0.79	-0.38	0.15	0.67	-0.31	0.88	-0.22	0.86	0.87	0.86	1			
Free CO_2	0.18	0.60	-0.32	-0.03	-0.32	0.02	-0.17	0.22	-0.32	-0.41	0.48	0.24	0.43	-0.31	0.51	-0.16	-0.12	-0.30	-0.22	1		
F	0.68	-0.12	-0.01	0.61	-0.57	0.34	0.14	0.19	0.45	-0.72	0.68	0.71	0.28	0.64	0.19	0.59	0.53	0.11	0.51	0.10	1	
MPN	0.37	-0.71	0.98	0.54	-0.23	0.60	0.74	-0.47	0.57	-0.02	-0.31	0.23	-0.51	0.66	-0.47	0.63	0.62	0.94	0.78	-0.42	0.02	1

Table- 7

Physico-chemical Characteristics of River Paisuni

Station-P_3 Period - 2005

Month	W. Temp. °C.	TUR. N.T.U.	W. C. Cum./Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
Jan	17.30	4.85	104.30	7.80	26.00	145.00	171.00	187.00	19.07	8.70	0.96	12.50	0.04	0.06	0.21	0.14	15.02	31.00	0.30	15.10	0.16	62.00
Feb	22.00	5.00	118.90	7.85	24.00	149.00	173.00	191.00	16.01	8.44	1.43	13.04	0.05	0.06	0.25	0.18	14.45	31.00	2.00	15.80	0.22	85.00
Mar	25.60	6.00	101.40	8.10	18.00	154.00	172.00	249.00	17.54	6.20	2.06	13.52	0.05	0.07	0.28	0.19	15.31	33.00	2.00	16.30	0.42	122.00
Apr	27.30	7.00	99.60	8.64	18.00	156.00	174.00	270.00	21.01	6.02	2.14	14.96	0.06	0.07	0.35	0.21	22.02	32.00	3.00	17.50	0.45	178.00
May	33.90	6.84	85.00	8.52	19.00	158.00	177.00	282.00	28.92	6.03	2.15	15.07	0.05	0.07	0.59	0.22	25.40	33.00	4.00	18.70	0.53	185.00
Jun	35.30	5.10	202.80	8.00	15.00	171.00	186.00	270.00	30.01	5.91	2.27	15.99	0.06	0.08	0.36	0.26	28.30	33.00	6.00	13.20	0.64	278.00
Jul	29.60	5.92	804.70	8.66	15.00	169.00	184.00	186.00	32.64	7.00	1.57	14.69	0.04	0.08	0.25	0.30	29.00	35.00	8.00	14.30	0.50	1116.00
Aug	29.50	4.10	1160.50	8.95	21.00	165.00	186.00	144.00	26.98	7.70	1.08	14.04	0.04	0.08	0.10	0.26	27.90	48.00	8.00	12.10	0.40	1805.00
Sep	30.80	3.90	600.70	8.90	18.00	156.00	174.00	165.00	27.04	6.90	1.82	15.65	0.04	0.08	0.12	0.22	25.00	37.00	7.00	15.50	0.51	603.00
Oct	26.80	3.50	118.40	8.00	23.00	146.00	169.00	175.00	25.06	7.05	1.77	14.22	0.04	0.08	0.21	0.23	20.38	32.00	6.00	13.40	0.81	305.00
Nov	22.30	3.26	128.00	8.20	25.00	142.00	167.00	198.00	24.00	7.90	1.57	13.10	0.04	0.07	0.39	0.20	17.41	32.00	5.00	13.10	0.32	197.00
Dec	20.60	4.21	101.80	7.92	27.00	145.00	172.00	190.00	20.31	8.71	1.26	13.00	0.04	0.07	0.22	0.16	17.01	30.00	3.00	12.60	0.33	105.00

Table- 8

Matrix Showing Correlation of Coefficient among various Physico-Chemical Parameters

Station-P_3																				Period - 2005	
	W. Temp. ^0C.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
W.T.	1																					
Tur	-0.12	1																				
W.C.	0.35	-0.76	1																			
PH	0.75	-0.38	0.53	1																		
CO_3	-0.85	-0.07	-0.25	-0.56	1																	
HCO_3	0.81	-0.21	0.59	0.53	-0.62	1																
T.A.	0.67	-0.36	0.72	0.44	-0.65	0.95	1															
T.H.	0.16	0.61	-0.81	-0.15	-0.49	0.23	0.04	1														
Cl.	0.61	-0.55	0.52	0.62	-0.33	0.52	0.57	0.23	1													
D.O.	0.83	0.28	0.01	-0.59	0.86	0.60	-0.34	0.54	0.26	1												
B.O.D.	0.69	0.46	-0.33	0.44	-0.74	0.37	0.09	0.64	0.11	0.93	1											
C.O.D.	0.93	-0.11	0.25	0.65	-0.86	0.72	0.53	0.26	0.51	0.81	0.73	1										
NH_4-N	0.34	0.78	-0.58	0.11	-0.49	0.23	0.03	0.84	-0.17	-0.62	0.73	0.40	1									
NO_2-N	0.67	0.69	0.63	0.67	-0.43	0.56	0.56	0.23	0.85	-0.39	0.17	0.64	0.23	1								
NO3-N	0.31	0.74	0.54	0.02	-0.25	0.05	-0.09	0.41	0.11	-0.48	0.61	0.22	0.70	0.19	1							
PO_4	0.78	0.46	0.61	0.83	-0.67	0.76	0.71	-0.04	0.85	0.52	0.34	0.71	0.04	0.81	0.05	1						
SO_4	0.86	0.45	0.59	0.72	-0.71	0.82	0.78	0.01	0.88	-0.57	0.37	0.81	0.06	0.88	0.08	0.93	1					
Na.	0.54	0.69	0.93	0.65	-0.35	0.66	0.76	0.38	0.67	-0.19	0.13	0.41	-0.41	0.74	-0.35	0.68	0.74	1				
K	0.74	-0.69	0.78	0.86	-0.47	0.63	0.64	0.37	0.79	-0.38	0.15	0.67	0.31	0.89	-0.22	0.86	0.87	0.86	1			
Free CO_2	0.21	0.69	-0.37	-0.03	-0.37	0.02	0.20	0.26	-0.37	-0.48	0.56	0.28	0.50	0.36	0.59	-0.19	-0.14	-0.35	-0.26	1		
F	0.68	-0.13	-0.01	0.61	-0.58	0.34	0.14	0.19	0.45	0.72	0.69	0.72	0.28	0.65	0.20	0.60	0.59	0.11	0.51	-0.42	1	
MPN	0.37	0.71	0.98	0.54	0.23	0.60	0.74	-0.47	0.57	-0.72	0.31	0.23	-0.51	0.66	-0.47	0.63	0.62	0.94	0.79	0.10	0.02	1

Table- 9

Physico-chemical Characteristics of River Paisuni

Station-P_4 Period - 2005

Month	W. Temp. °C.	TUR. N.T.U.	W. C. Cum./Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
Jan	8.10	3.20	65.70	8.30	27.00	145.00	172.00	185.00	20.00	9.08	0.98	12.51	0.04	0.06	0.21	0.18	18.41	32.00	3.00	15.20	0.16	60.00
Feb	22.30	4.20	82.80	8.45	24.00	149.00	173.00	192.00	16.32	8.45	1.44	13.05	0.05	0.06	0.25	0.20	15.34	33.00	2.00	15.90	0.24	84.00
Mar	24.80	4.96	66.40	7.76	19.00	155.00	174.00	245.00	17.89	6.20	2.10	13.52	0.05	0.07	0.28	0.19	20.61	31.00	3.00	17.60	0.40	120.00
Apr	27.80	5.00	48.40	7.79	18.00	156.00	174.00	268.00	22.00	6.03	2.15	14.97	0.06	0.07	0.35	0.20	31.11	32.00	3.00	18.60	0.44	176.00
May	34.20	5.10	70.70	8.00	19.00	158.00	177.00	280.00	28.92	6.04	2.16	15.08	0.06	0.07	0.59	0.33	30.15	34.00	5.00	13.20	0.53	182.00
Jun	36.30	5.96	178.00	8.10	14.00	172.00	186.00	270.00	32.68	5.92	2.27	15.99	0.06	0.08	0.36	0.40	32.41	35.00	6.00	14.40	0.63	275.00
Jul	29.70	6.12	788.40	8.50	14.00	169.00	175.00	185.00	31.24	7.01	1.58	14.70	0.04	0.08	0.25	0.42	24.39	36.00	6.00	13.50	0.50	1108.00
Aug	30.00	4.80	1102.60	8.80	22.00	166.00	188.00	160.00	24.36	7.70	1.08	14.05	0.04	0.08	0.10	0.39	22.50	39.00	6.00	17.60	0.40	1797.00
Sep	31.10	4.10	591.30	8.84	19.00	156.00	175.00	161.00	26.21	6.91	1.83	15.65	0.04	0.08	0.12	0.30	21.09	36.00	4.00	15.70	0.52	6030.00
Oct	28.80	4.00	103.00	8.79	24.00	146.00	170.00	172.00	23.40	7.05	1.77	14.22	0.04	0.08	0.21	0.28	21.41	33.00	3.00	13.50	0.83	302.00
Nov	23.60	3.90	110.60	8.20	26.00	143.00	169.00	192.00	22.06	7.90	1.57	13.10	0.04	0.07	0.39	0.22	20.56	32.00	2.00	13.10	0.33	195.00
Dec	21.20	3.50	91.00	8.02	27.00	145.00	172.00	187.00	21.04	8.75	1.30	13.01	0.04	0.07	0.39	0.20	19.01	31.00	1.00	12.70	0.32	106.00

Table- 10

Matrix Showing Correlation of Coefficient among various Physico-Chemical Parameters

Station-P_4																				Period - 2005	
	W. Temp. ^0C.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N . Org/l.
W.T.	1																					
Tur	0.73	1																				
W.C.	0.32	0.33	1																			
PH	0.73	-0.06	-0.33	1																		
CO_3	0.73	-0.94	-0.31	-0.94	1																	
HCO_3	0.69	0.90	0.59	0.90	-0.88	1																
T.A.	0.54	0.57	0.58	0.57	-0.51	0.82	1															
T.H.	0.36	0.52	0.51	0.52	-0.50	0.31	0.19	1														
Cl.	0.70	0.68	0.40	0.69	-0.71	0.74	0.52	0.24	1													
D.O.	-0.79	-0.75	0.01	-0.75	0.82	-0.60	-0.34	-0.39	-0.53	1												
B.O.D.	0.68	0.59	-0.35	0.59	-0.68	0.36	0.10	0.78	0.38	-0.92	1											
C.O.D.	0.86	0.69	0.27	0.69	-0.83	0.72	0.51	0.40	0.79	-0.81	0.71	1										
NH_4-N	0.33	0.46	0.53	0.46	-0.48	0.26	0.14	0.92	0.21	-0.65	0.75	0.47	1									
NO_2-N	0.67	0.42	0.67	0.42	-0.42	0.56	0.48	-0.22	0.75	-0.36	0.12	0.60	-0.24	1								
NO3-N	0.20	0.19	-0.59	0.19	-0.09	-0.07	-0.15	0.74	0.20	-0.31	0.49	0.99	0.59	-0.20	1							
PO_4	0.72	0.72	-0.70	0.72	-0.66	0.84	0.71	-0.01	0.88	-0.41	0.16	0.67	-0.04	0.81	-0.10	1						
SO_4	0.68	0.15	-0.01	0.71	-0.72	0.64	0.49	0.75	0.71	-0.80	0.71	0.79	0.77	0.39	0.49	0.50	1					
Na.	0.54	0.00	0.90	0.45	-0.44	0.72	0.75	-0.30	0.59	-0.17	-0.14	0.51	-0.28	0.69	-0.45	0.85	0.23	1				
K	0.62	0.45	0.65	0.77	-0.75	0.91	0.78	0.17	0.80	-0.52	0.22	0.68	0.12	0.64	-0.13	0.91	0.59	0.82	1			
Free CO_2	0.03	0.77	0.19	0.13	-0.20	0.22	0.31	0.14	-0.37	-0.23	0.09	0.07	0.22	-0.23	-0.43	-0.19	0.07	0.13	0.09	1		
F	0.75	0.13	0.09	0.4.33	0.49	0.36	0.18	0.15	0.59	-0.66	0.59	0.70	0.22	0.69	0.04	0.54	0.51	0.28	0.42	-0.22	1	
MPN	0.29	0.43	0.56	-0.04	-0.21	0.21	0.17	-0.45	0.26	-0.09	-0.01	0.46	-0.39	0.44	-0.53	0.30	-0.09	0.56	0.26	0.15	0.17	1

Table- 11

Physico-chemical Characteristics of River Paisuni

Station-P_5																					Period - 2005
Month	W. Temp. °C.	TUR. N.T.U.	W. C. Cum./Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
Jan	18.40	5.00	135.00	8.26	27.00	145.00	172.00	184.00	20.30	9.09	0.99	12.52	0.04	0.06	0.21	0.16	16.40	32.00	3.00	15.20	0.16	61.00
Feb	22.50	4.20	137.70	8.14	25.00	150.00	175.00	192.00	16.32	8.45	1.45	13.04	0.05	0.06	0.25	0.22	20.15	34.00	2.00	16.00	0.25	84.00
Mar	24.70	4.84	142.50	7.96	20.00	156.00	176.00	242.00	17.94	6.21	2.12	13.51	0.05	0.07	0.28	0.20	22.66	33.00	3.00	17.60	0.43	121.00
Apr	27.50	5.02	105.00	7.99	19.00	157.00	176.00	268.00	22.01	6.04	2.16	14.97	0.06	0.07	0.35	0.21	26.11	35.00	4.00	18.60	0.44	175.00
May	33.40	5.84	100.90	8.00	19.00	158.00	177.00	280.00	28.98	6.06	2.17	15.09	0.05	0.07	0.59	0.32	24.54	34.00	5.00	13.40	0.54	182.00
Jun	35.60	6.01	220.50	8.10	15.00	173.00	188.00	272.00	32.64	5.93	2.29	15.99	0.06	0.08	0.36	0.40	24.00	34.00	6.00	14.50	0.64	275.00
Jul	28.90	7.65	829.80	8.34	15.00	170.00	185.00	184.00	35.32	7.03	1.59	14.72	0.04	0.08	0.25	0.39	28.46	36.00	6.00	13.50	0.50	1107.00
Aug	29.70	8.00	1204.80	8.54	23.00	167.00	190.00	154.00	34.05	7.70	1.08	14.07	0.04	0.09	0.10	0.32	23.10	41.00	5.00	13.20	0.35	1797.00
Sep	31.40	7.00	653.80	8.64	19.00	156.00	175.00	159.00	30.41	6.92	1.84	15.66	0.04	0.08	0.02	0.30	22.41	37.00	4.00	15.80	0.42	604.00
Oct	28.30	6.00	134.00	8.40	25.00	147.00	172.00	170.00	25.21	7.05	1.77	14.24	0.04	0.82	0.21	0.25	17.65	33.00	4.00	13.50	0.52	302.00
Nov	23.80	5.90	150.90	8.71	26.00	143.00	169.00	178.00	22.41	7.91	1.58	13.14	0.04	0.07	0.39	0.21	17.00	31.00	2.00	13.10	0.32	196.00
Dec	20.80	4.10	165.50	8.55	27.00	145.00	172.00	169.00	21.00	8.78	1.40	13.02	0.04	0.07	0.39	0.13	16.45	31.00	1.00	12.80	0.32	107.00

Table- 12

Matrix Showing Correlation of Coefficient among various Physico-Chemical Parameters

Station-P_5																			Period - 2005		
	W. Temp. ^0C.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
W.T.	1																					
Tur	0.60	1																				
W.C.	0.32	0.85	1																			
PH	0.16	0.39	0.44	1																		
CO_3	-0.78	-0.46	-0.27	0.42	1																	
HCO_3	0.52	0.05	-0.10	-0.24	-0.48	1																
T.A.	0.62	0.63	0.69	-0.17	-0.65	0.50	1															
T.H.	0.42	-0.28	-0.49	-0.85	-0.55	0.45	0.17	1														
Cl.	0.77	0.89	0.72	0.24	-0.63	0.34	0.75	-0.04	1													
D.O.	-0.80	0.27	0.03	0.52	0.82	-0.38	-0.38	-0.72	0.74	1												
B.O.D.	0.64	0.09	0.39	-0.55	-0.68	0.43	0.08	0.79	-0.39	-0.90	1											
C.O.D.	0.94	0.51	0.24	-0.19	-0.84	0.51	0.52	0.44	0.10	-0.81	0.69	1										
NH_4-N	0.33	-0.37	0.54	-0.76	-0.45	0.45	0.08	0.91	0.71	-0.61	0.72	0.42	1									
NO_2-N	0.10	0.81	-0.15	0.13	0.22	0.08	-0.22	-0.24	-0.13	-0.07	0.05	0.04	-0.15	1								
NO3-N	0.08	-0.42	-0.60	-0.44	-0.08	0.16	-0.17	0.68	0.02	-0.26	0.45	0.01	0.60	-0.17	1							
PO_4	0.87	0.76	0.53	-0.08	-0.80	0.51	0.79	0.22	-0.17	-0.57	0.35	0.78	0.11	-0.01	-0.50	1						
SO_4	0.67	0.49	0.41	-0.45	-0.91	0.19	0.69	0.68	0.88	-0.72	0.50	0.71	0.42	-0.29	-0.07	0.72	1					
Na.	0.52	0.75	0.87	0.10	-0.41	-0.03	0.74	-0.17	0.58	-0.25	0.11	0.46	-0.19	-0.12	0.06	0.59	0.60	1				
K	0.82	0.73	0.48	-0.26	-0.81	0.44	0.78	0.34	0.66	-0.66	0.36	0.78	0.24	0.07	0.54	0.91	0.77	0.60	1			
Free CO_2	0.10	-0.37	-0.29	-0.59	-0.23	0.04	-0.12	0.42	0.84	-0.34	0.39	0.09	0.51	-0.23	-0.07	-0.24	0.29	0.03	-0.08	1		
F	0.87	0.37	0.04	-0.31	-0.78	0.54	0.46	0.54	-0.45	-0.87	0.80	0.84	0.45	0.28	0.16	0.72	0.60	0.18	0.72	0.07	1	
MPN	0.36	0.86	0.98	0.38	-0.26	0.09	0.73	-0.42	0.59	-0.03	-0.36	0.24	-0.47	-0.04	0.29	0.55	0.43	0.87	0.53	0.34	0.11	1

Table- 13

Physico-chemical Characteristics of River Paisuni

Station-P_1																					Period - 2006
Month	W. Temp. ^{0}C.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
Jan	17.45	3.20	26.50	7.80	26.00	144.00	170.00	186.00	18.40	8.90	1.10	12.60	0.05	0.06	0.20	0.17	12.10	32.00	0.25	14.10	0.13	61.00
Feb	22.50	3.24	45.02	8.10	23.00	149.00	172.00	189.00	15.00	8.40	1.40	13.01	0.05	0.06	0.25	0.21	11.90	32.00	1.10	15.30	0.21	88.00
Mar	24.40	3.00	48.60	8.10	19.00	154.00	173.00	230.00	17.60	6.30	2.10	13.40	0.05	0.06	0.28	0.19	11.50	33.00	2.30	16.20	0.42	121.00
Apr	26.10	3.30	18.80	8.20	18.00	156.00	174.00	265.00	20.21	6.20	2.20	14.50	0.05	0.07	0.35	0.19	20.80	33.00	3.00	18.20	0.45	173.00
May	33.20	4.60	30.50	8.40	17.00	176.00	193.00	282.00	26.20	6.10	2.13	15.00	0.05	0.07	0.58	0.22	25.10	35.00	4.00	12.10	0.52	186.00
Jun	34.40	5.01	102.90	8.50	15.00	172.00	187.00	271.00	30.50	5.90	2.24	15.98	0.05	0.08	0.31	0.28	29.60	35.00	5.20	13.20	0.63	278.00
Jul	29.56	6.40	706.70	8.20	15.00	169.00	184.00	186.00	24.20	6.80	1.55	14.60	0.04	0.08	0.24	0.31	26.70	37.00	6.30	15.20	0.49	1501.00
Aug	30.01	4.10	1035.40	8.10	20.00	164.00	184.00	157.00	24.20	7.70	1.02	14.01	0.03	0.08	0.10	0.29	24.90	39.00	6.20	13.10	0.40	2000.00
Sep	30.05	3.65	502.80	8.00	19.00	157.00	176.00	165.00	25.42	6.70	1.70	15.40	0.04	0.08	0.12	0.27	19.10	34.00	4.10	17.90	0.51	1604.00
Oct	27.01	4.50	95.70	7.70	23.00	144.00	167.00	174.00	28.01	7.10	1.57	14.10	0.04	0.08	0.21	0.23	17.70	33.00	2.20	12.10	0.72	1302.00
Nov	22.20	5.24	40.70	8.10	25.00	142.00	167.00	193.00	23.26	7.90	1.58	13.01	0.04	0.07	0.35	0.22	13.40	34.00	1.00	13.90	0.24	196.00
Dec	20.60	6.20	20.90	7.90	26.00	145.00	171.00	200.00	20.20	8.70	1.20	12.92	0.04	0.06	0.22	0.18	12.00	34.00	1.00	13.20	0.31	108.00

Table- 14

Matrix Showing Correlation of Coefficient among various Physico-Chemical Parameters

Station-P_1																					Period - 2006	
	W. Temp. ^{0}C.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
W.T.	1																					
Tur	0.20	1																				
W.C.	0.41	0.18	1																			
PH	0.38	0.15	0.05	1																		
CO_3	-0.86	-0.09	-0.35	-0.76	1																	
HCO_3	0.87	0.19	0.40	0.82	-0.90	1																
T.A.	0.82	0.23	0.39	0.78	-0.78	0.98	1															
T.H.	0.36	0.03	-0.53	0.72	-0.49	0.50	0.47	1														
Cl.	0.77	0.45	0.26	0.30	0.47	0.50	0.48	0.16	1													
D.O.	-0.80	0.05	0.04	-0.64	0.88	-0.70	-0.56	-0.63	-0.54	1												
B.O.D.	0.53	-0.14	-0.39	0.65	-0.67	0.48	0.35	0.83	0.30	-0.89	1											
C.O.D.	0.93	0.14	0.27	0.61	-0.85	0.78	0.69	0.41	0.77	-0.83	0.62	1										
NH_4-N	0.12	-0.15	-0.76	0.52	-0.27	0.24	0.21	0.90	0.01	-0.41	0.73	0.22	1									
NO_2-N	0.75	0.29	0.67	0.16	0.54	0.52	0.47	-0.17	0.83	-0.49	0.08	0.67	-0.37	1								
NO3-N	0.24	0.10	0.55	0.59	-0.28	0.37	0.39	0.83	0.11	-0.43	0.65	0.19	0.78	-0.17	1							
PO_4	0.74	0.40	0.79	0.39	-0.64	0.62	0.57	0.23	0.64	-0.38	0.01	0.66	-0.40	0.83	-0.27	1						
SO_4	0.90	0.34	0.50	0.66	0.83	0.88	0.84	0.34	0.75	-0.65	0.37	0.85	0.10	0.76	0.19	0.77	1					
Na.	0.59	0.48	0.85	0.38	-0.47	0.62	0.65	-0.15	0.48	-0.21	-0.17	0.39	-0.49	0.70	-0.15	0.78	0.70	1				
K	0.86	0.28	0.76	0.56	0.84	0.85	0.79	0.08	0.60	-0.61	0.23	0.76	-0.21	0.79	-0.07	0.88	0.90	0.84	1			
Free CO_2	-0.11	-0.45	0.04	0.04	-0.23	-0.08	-0.21	-0.01	-0.41	-0.23	0.28	0.10	-0.02	-0.24	0.21	-0.07	-0.16	-0.27	0.01	1		
F	0.79	0.21	0.16	0.24	-0.64	0.50	0.40	0.26	0.79	-0.77	0.54	0.79	0.11	0.73	0.11	0.51	0.65	0.28	0.59	-0.14	1	
MPN	0.46	0.17	0.89	-0.18	-0.28	0.25	0.22	-0.61	0.45	-0.12	-0.33	0.37	-0.78	0.82	-0.59	0.78	0.46	0.68	0.68	0.01	0.43	1

Table-15

Statistical Values of River Paisuni

Station-P_1

Parameter	2005				2006				Total			
	Mean	Std. Dev.	Max.	Min.	Mean	Std. Dev.	Max.	Min.	Mean	Std. Dev.	Max.	Min.
W.T.	26.35	5.32	35.00	17.00	26.45	4.98	34.40	17.45	26.40	5.15	34.70	17.23
Turbidity	3.81	0.66	5.10	3.00	4.37	1.12	6.40	3.00	4.09	0.89	5.75	3.00
Water current	215.30	326.83	1034.50	20.80	222.87	325.58	1035.40	20.90	219.09	326.21	1034.95	20.85
pH	8.08	0.19	8.50	7.90	8.09	0.22	8.50	7.70	8.09	0.21	8.50	7.80
CO_3	20.08	4.05	26.00	14.00	19.66	3.84	26.00	15.00	19.87	3.95	26.00	14.50
HCO_3	154.16	9.23	170.00	142.00	156.00	11.36	176.00	142.00	155.08	10.30	173.00	142.00
T.A.	174.33	6.02	185.00	170.00	176.50	8.10	193.00	170.00	175.42	7.06	189.00	170.00
T.H.	209.16	43.22	282.00	173.00	200.16	41.23	282.00	157.00	204.66	42.23	282.00	165.00
Cl	22.99	4.47	31.51	17.50	22.76	4.37	30.50	15.00	22.88	4.42	31.01	16.25
D.O.	7.20	1.05	9.00	5.90	7.22	1.02	8.90	6.10	7.21	1.04	8.95	6.00
B.O.D.	1.62	0.43	2.25	0.90	1.64	0.42	2.24	1.10	1.63	0.43	2.25	1.00
C.O.D.	14.10	1.09	15.98	12.50	14.04	1.04	15.98	12.60	14.07	1.07	15.98	12.55
NH_4-N	0.07	0.01	0.06	0.04	0.04	0.01	0.05	0.03	0.06	0.01	0.06	0.04
NO_2-N	0.07	0.01	0.08	0.06	0.07	0.01	0.08	0.06	0.07	0.01	0.08	0.06
NO_3-N	0.28	0.13	0.59	0.10	0.27	0.12	0.58	0.10	0.27	0.13	0.59	0.10
PO_4	0.22	0.04	0.28	0.16	0.26	0.04	0.31	0.17	0.24	0.04	0.30	0.17
SO_4	18.72	6.23	29.30	11.30	18.73	6.34	29.60	12.00	18.73	6.29	29.45	11.65
Na	33.90	1.98	38.00	31.00	30.25	1.96	39.00	32.00	32.08	1.97	38.50	31.50
K	2.91	1.94	6.00	1.00	3.05	2.01	6.30	0.30	2.98	1.98	6.15	0.65
CO_2	14.92	1.91	18.10	12.20	14.54	1.97	18.20	12.10	14.73	1.94	18.15	12.15
F	0.42	0.18	0.51	0.12	0.42	0.17	0.63	0.13	0.42	0.18	0.57	0.13
MPN	633.15	701.41	2000.00	86.00	630.83	701.36	2000.00	88.00	631.99	701.39	2000.00	87.00

Table- 16

Physico-chemical Characteristics of River Paisuni

Station-P_2 Period - 2006

Month	W. Temp. ^{0}C.	TUR. N.T.U.	W. C. Cum./Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
Jan	17.40	5.50	31.10	7.06	27.00	146.00	173.00	188.00	19.00	8.90	1.10	12.50	0.04	0.06	0.21	0.15	14.80	32.00	0.30	14.70	0.15	62.00
Feb	22.50	6.40	45.50	8.10	25.00	149.00	174.00	190.00	16.10	8.50	1.52	13.04	0.05	0.06	0.25	0.18	13.80	31.00	2.10	14.80	0.22	86.00
Mar	25.20	6.60	49.70	8.30	19.00	154.00	173.00	247.00	17.40	6.30	2.11	13.60	0.05	0.08	0.28	0.19	17.20	32.00	2.20	15.90	0.43	122.00
Apr	27.30	7.40	19.50	8.10	18.00	156.00	174.00	265.00	20.30	6.00	2.33	15.96	0.07	0.07	0.35	0.21	21.30	32.00	3.10	17.20	0.45	177.00
May	34.00	7.00	30.90	8.50	20.00	157.00	177.00	284.00	27.10	6.00	2.31	16.07	0.05	0.07	0.59	0.23	25.40	34.00	5.00	18.70	0.53	185.00
Jun	35.40	5.10	104.60	8.70	15.00	173.00	188.00	274.00	32.10	5.80	2.40	16.00	0.06	0.08	0.36	0.28	31.30	35.00	6.20	13.00	0.64	280.00
Jul	29.90	4.20	719.50	8.70	15.00	166.00	181.00	187.00	32.40	7.10	1.56	15.71	0.04	0.08	0.25	0.28	29.60	37.00	7.10	15.00	0.50	1112.00
Aug	28.40	2.00	1041.20	8.80	22.00	166.00	188.00	147.00	30.20	7.70	1.14	15.04	0.04	0.08	0.10	0.24	28.00	40.00	9.00	11.00	0.31	1804.00
Sep	30.10	2.30	504.00	8.70	20.00	156.00	176.00	163.00	26.20	6.90	1.90	16.78	0.04	0.08	0.12	0.24	26.60	35.00	8.00	15.40	0.50	604.00
Oct	27.00	3.50	99.00	8.80	24.00	145.00	169.00	177.00	27.30	7.10	1.76	15.40	0.04	0.08	0.21	0.23	22.50	33.00	7.00	13.20	0.79	307.00
Nov	23.00	4.60	42.40	8.70	26.00	143.00	169.00	197.00	3.40	7.80	1.57	14.20	0.04	0.07	0.39	0.23	20.90	34.00	5.00	13.00	0.32	197.00
Dec	20.60	4.50	22.10	7.20	27.00	145.00	172.00	191.00	24.90	8.90	1.22	14.10	0.04	0.07	0.22	0.18	18.20	35.00	4.00	12.00	0.31	198.00

Table- 17

Matrix Showing Correlation of Coefficient among various Physico-Chemical Parameters

Station-P_2 — Period - 2006

	W. Temp. ^{0}C.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3- N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P. N. Org/l.
W.T.	1																					
Tur	-0.09	1																				
W.C.	0.30	-0.72	1																			
PH	0.74	-0.36	0.46	1																		
CO_3	0.81	-0.11	-0.30	-0.54	1																	
HCO_3	0.78	-0.14	0.56	0.49	-0.85	1																
T.A.	0.63	-0.28	0.64	0.37	-0.61	0.94	1															
T.H.	0.44	0.79	-0.57	0.00	-0.48	0.27	0.08	1														
Cl.	0.61	-0.34	0.51	0.22	-0.55	0.69	0.67	0.00	1													
D.O.	-0.83	-0.26	0.02	-0.61	0.83	-0.59	-0.32	-0.69	-0.32	1												
B.O.D.	0.70	0.48	-0.35	0.42	-0.69	0.38	0.11	0.82	0.13	0.01	1											
C.O.D.	0.85	0.27	0.34	0.65	-0.67	0.56	0.39	0.22	0.57	-0.92	0.59	1										
NH_4-N	0.30	0.70	-0.43	-0.02	-0.42	0.25	0.09	0.79	0.00	-0.71	0.70	0.24	1									
NO_2-N	0.63	-0.60	0.58	0.65	-0.52	0.59	0.47	-0.08	0.58	-0.49	0.21	0.67	-0.16	1								
NO3-N	0.37	0.70	-0.54	0.10	-0.23	0.04	-0.10	0.84	-0.20	-0.50	0.63	0.18	0.51	-0.16	1							
PO_4	0.84	-0.39	0.51	0.83	-0.72	0.72	0.60	0.10	0.52	-0.60	0.40	0.79	0.03	0.74	0.14	1						
SO_4	0.86	-0.46	0.60	0.70	-0.71	0.80	0.73	0.09	0.68	-0.58	0.34	0.84	0.03	0.80	0.07	0.94	1					
Na.	0.40	0.72	0.87	0.41	-0.26	0.58	0.70	-0.39	0.55	-0.01	-0.30	0.42	-0.38	0.72	-0.31	0.61	0.73	1				
K	0.64	0.77	0.73	0.76	-0.37	0.50	0.51	-0.34	0.56	-0.29	0.04	0.74	-0.30	0.83	0.24	0.81	0.84	0.80	1			
Free CO_2	0.26	0.68	-0.36	-0.02	-0.36	0.01	-0.22	0.62	0.67	-0.51	0.62	0.22	0.47	-0.30	0.60	-0.10	-0.11	-0.51	-0.36	1		
F	0.72	-0.14	0.00	0.63	-0.55	0.32	0.12	0.29	0.51	-0.71	0.64	0.73	0.22	0.65	0.21	0.66	0.60	0.08	0.54	0.13	1	
MPN	0.31	-0.69	0.98	0.46	-0.28	0.56	0.66	-0.52	0.51	0.01	-0.35	0.33	-0.35	0.61	-0.48	0.51	0.61	0.91	0.74	-0.42	0.02	1

Table-18

Statistical Values of River Paisuni

Station-P_2

Parameter	2005				2006				Total			
	Mean	Std. Dev.	Max.	Min.	Mean	Std. Dev.	Max.	Min.	Mean	Std. Dev.	Max.	Min.
W.T.	26.65	5.21	33.80	17.20	26.73	5.09	35.40	17.40	26.69	10.30	34.60	17.30
Turbidity	4.64	1.64	7.22	1.90	71.10	1.68	7.40	2.00	37.87	3.32	7.31	1.90
Water current	225.11	325.52	1040.80	21.70	225.79	325.82	1041.20	22.10	225.45	651.34	10.41	21.90
pH	8.30	0.62	8.96	7.00	8.31	0.58	8.80	7.20	8.30	1.20	8.88	7.10
CO_3	21.08	4.03	27.00	14.00	21.50	4.15	27.00	15.00	21.29	8.18	27.00	14.50
HCO_3	155.00	9.48	172.00	143.00	154.66	9.28	173.00	143.00	154.83	18.76	172.50	143.00
T.A.	176.08	6.34	188.00	171.00	176.16	6.15	188.00	172.00	176.12	12.49	188.00	171.50
T.H.	201.75	38.36	273.00	150.00	209.16	43.94	284.00	190.00	205.45	82.30	278.50	170.00
Cl	25.30	5.61	32.04	16.00	25.28	7.95	32.40	16.10	25.30	13.56	32.22	16.05
D.O.	7.23	1.06	9.02	6.00	7.25	1.07	8.90	5.80	7.24	2.13	8.96	5.90
B.O.D.	1.66	0.43	2.26	0.95	1.74	0.45	2.40	1.10	1.70	0.88	2.33	1.02
C.O.D.	14.14	1.09	15.9 9	12.50	14.86	1.30	16.78	12.50	14.50	2.39	32.77	12.50
NH_4-N	0.04	0.01	0.06 0	0.04	0.05	0.01	0.07	0.04	0.05	0.02	0.07	0.04
NO_2-N	0.07	0.01	0.07 9	0.06	0.07	0.01	0.08	0.06	0.07	0.02	0.08	0.07
NO_3-N	0.28	0.13	0.59	0.10	0.28	0.13	0.59	0.10	0.27	0.26	0.59	0.10
PO_4	0.22	0.04	0.29	0.14	0.22	0.04	0.28	0.15	0.22	0.08	0.28	0.15
SO_4	22.33	5.56	31.30	13.60	22.40	5.54	31.30	13.80	22.36	11.10	31.30	13.70
Na	33.40	2.90	41.00	30.00	34.17	2.41	40.00	31.00	67.56	5.31	40.50	30.50
K	4.52	2.62	9.00	0.29	6.49	2.54	9.00	0.30	5.50	5.16	9.00	0.29
CO_2	14.46	2.05	18.60	12.30	14.49	2.10	18.70	11.00	14.47	4.15	18.65	11.65
F	0.43	0.18	0.80	0.15	0.43	0.17	0.79	0.15	0.43	0.35	0.79	0.15
MPN	418.80	504.18	1803.00	61.00	427.83	500.13	1084.00	62.00	4.51	1004.31	1803.50	61.50

Table- 18

Physico-chemical Characteristics of River Paisuni

Station-P_3 Period - 2006

Month	W. Temp. ^{0}C.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
Jan	17.10	5.01	104.20	7.85	25.00	147.00	172.00	185.00	19.01	8.71	1.00	13.20	0.04	0.06	0.22	0.16	15.04	32.00	1.00	15.20	0.17	63.00
Feb	21.40	5.04	118.00	7.81	22.00	150.00	172.00	190.00	15.01	8.42	1.43	13.04	0.04	0.06	0.21	0.20	14.48	31.00	2.00	15.90	0.21	84.00
Mar	24.50	6.07	101.20	8.12	15.00	152.00	167.00	248.00	17.55	6.22	2.07	13.50	0.04	0.07	0.25	0.21	15.34	33.00	3.00	16.50	0.40	121.00
Apr	27.80	7.01	99.70	8.62	16.00	154.00	170.00	271.00	20.54	6.04	2.12	14.82	0.06	0.07	0.28	0.22	22.06	32.00	3.00	17.80	0.46	179.00
May	33.50	6.86	85.01	8.54	17.00	155.00	172.00	283.00	28.80	6.06	2.13	15.01	0.05	0.07	0.35	0.23	25.45	34.00	4.00	18.80	0.54	188.00
Jun	34.30	4.10	203.10	8.05	15.00	171.00	186.00	266.00	29.05	5.90	2.20	15.90	0.03	0.08	0.59	0.27	28.36	35.00	5.00	13.50	0.63	279.00
Jul	29.60	6.04	804.80	8.60	14.00	165.00	179.00	185.00	31.60	7.01	1.58	14.63	0.04	0.08	0.36	0.31	29.01	36.00	6.00	14.10	0.52	1112.00
Aug	29.40	4.50	1120.10	8.95	20.00	156.00	176.00	142.00	26.99	7.90	1.09	14.01	0.04	0.08	0.25	0.28	27.12	45.00	8.00	12.50	0.43	1800.00
Sep	29.60	3.50	585.40	8.92	17.00	144.00	161.00	167.00	27.03	6.80	1.80	14.65	0.04	0.08	0.10	0.24	25.04	36.00	7.00	15.60	0.52	605.00
Oct	25.80	3.10	115.40	8.00	21.00	141.00	162.00	174.00	24.08	7.06	1.72	14.23	0.03	0.08	0.12	0.24	20.43	31.00	6.00	13.60	0.82	307.00
Nov	21.20	3.40	125.20	8.20	24.00	140.00	164.00	199.00	24.01	7.80	1.52	13.11	0.04	0.07	0.21	0.21	17.39	32.00	6.00	13.20	0.33	199.00
Dec	20.70	4.60	102.40	7.94	27.00	144.00	171.00	187.00	20.36	8.80	1.26	13.01	0.04	0.07	0.22	0.17	17.08	31.00	4.00	12.70	0.35	101.00

Table- 19

Matrix Showing Correlation of Coefficient among various Physico-Chemical Parameters

Station-P_3 Period - 2006

	W. Temp. °C.	TUR. N.T.U.	W. C. Cum./Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
W.T.	1																					
Tur	0.19	1																				
W.C.	0.37	-0.11	1																			
PH	0.61	0.17	0.73	1																		
CO_3	-0.79	-0.43	-0.28	-0.91	1																	
HCO_3	0.67	0.43	0.33	0.21	-0.69	1																
T.A.	0.40	0.30	0.26	-0.04	-0.30	0.90	1															
T.H.	0.40	0.61	-0.57	-0.10	-0.48	0.42	0.26	1														
Cl.	0.77	-0.09	0.55	0.60	-0.48	0.48	0.34	0.01	1													
D.O.	0.79	-0.35	0.06	-0.39	0.88	-0.50	-0.12	-0.71	-0.43	1												
B.O.D.	0.66	0.33	0.33	0.16	-0.75	0.37	0.03	0.81	0.24	-0.94	1											
C.O.D.	0.92	0.17	0.19	0.46	-0.77	0.68	0.43	0.49	0.72	-0.82	0.70	1										
NH_4-N	0.10	0.72	-0.17	0.40	-0.28	0.00	-0.17	0.51	0.14	0.37	0.35	0.16	1									
NO_2-N	0.67	-0.28	0.69	0.68	-0.34	0.28	0.17	-0.24	0.86	-0.30	0.10	0.56	-0.21	1								
NO3-N	0.58	0.33	0.01	-0.03	-0.49	0.90	0.88	0.61	0.44	-0.48	0.44	0.64	-0.04	0.19	1							
PO_4	0.78	0.00	0.72	0.61	-0.71	0.64	0.42	-0.06	0.75	-0.50	0.28	0.67	-0.15	0.76	0.42	1						
SO_4	0.89	0.07	0.64	0.71	-0.64	0.66	0.48	0.08	0.92	-0.54	0.32	0.84	0.00	0.84	0.53	0.88	1					
Na.	0.50	-0.04	0.90	0.73	-0.31	0.41	0.35	-0.34	0.54	-0.08	-0.20	0.30	-0.10	0.66	0.18	0.65	0.65	1				
K	0.51	-0.49	0.71	0.66	-0.22	0.05	-0.07	0.43	0.72	-0.17	-0.01	0.33	-0.30	0.91	-0.05	0.71	0.66	0.66	1			
Free CO_2	0.20	0.73	-0.39	0.14	-0.42	0.07	0.17	0.66	-0.19	-0.50	0.54	0.24	-0.74	-0.43	0.03	-0.20	-0.08	-0.29	-0.51	1		
F	0.69	-0.21	0.12	0.28	-0.50	0.22	-0.02	0.15	0.61	-0.64	0.56	0.71	-0.16	0.67	0.20	0.61	0.61	0.13	0.56	-0.07	1	
MPN	0.40	0.09	0.98	0.71	-0.26	0.33	0.28	-0.52	0.56	0.03	-0.32	0.21	-0.15	0.72	0.04	0.74	0.65	0.93	0.73	-0.41	0.19	1

Table-21

Statistical Values of River Paisuni

Station-P_3

Parameter	2005				2006				Total			
	Mean	Std. Dev.	Max.	Min.	Mean	Std. Dev.	Max.	Min.	Mean	Std. Dev.	Max.	Min.
W.T.	26.75	5.22	35.30	17.30	26.24	5.16	34.30	17.10	26.50	5.19	34.80	17.20
Turbidity	4.97	1.20	7.00	3.50	4.93	1.27	7.01	3.10	4.95	1.24	7.01	3.30
Water current	302.17	340.80	1160.50	85.00	297.04	331.55	1120.10	101.20	299.61	336.18	1140.30	93.10
pH	8.29	0.40	8.95	7.80	8.30	0.39	8.95	7.81	8.30	0.40	8.95	7.81
CO_3	20.75	4.00	27.00	15.00	19.41	4.19	27.00	14.00	20.08	4.10	27.00	14.50
HCO_3	154.66	9.35	171.00	142.00	151.58	9.03	171.00	140.00	153.12	9.19	171.00	141.00
T.A.	175.00	6.22	186.00	167.00	171.00	6.86	186.00	170.00	173.00	6.54	186.00	168.50
T.H.	188.66	44.26	282.00	144.00	208.08	44.40	283.00	142.00	198.37	44.33	282.50	143.00
Cl	24.04	5.05	32.64	16.01	23.66	4.96	31.60	15.01	23.85	5.01	32.12	15.51
D.O.	7.21	1.02	8.71	6.02	7.22	1.03	8.80	5.90	7.22	1.03	8.76	5.96
B.O.D.	1.67	0.42	2.27	0.96	1.66	0.40	2.20	1.00	1.67	0.41	2.24	0.98
C.O.D.	14.15	1.09	15.99	12.50	13.26	0.90	15.90	13.01	13.70	1.00	15.95	12.76
NH_4-N	0.05	0.01	0.06	0.04	0.04	0.01	0.04	0.03	0.04	0.01	0.05	0.03
NO_2-N	0.07	0.01	0.08	0.06	0.07	0.01	0.08	0.06	0.07	0.01	0.08	0.06
NO_3-N	0.28	0.13	0.59	0.10	0.26	0.12	0.59	0.10	0.27	0.13	0.59	0.10
PO_4	0.21	0.04	0.30	0.14	0.23	0.04	0.31	0.16	0.22	0.04	0.31	0.15
SO_4	21.43	5.32	29.00	14.45	21.40	5.24	29.01	15.04	21.42	5.28	29.01	14.75
Na	33.91	4.61	48.00	30.00	34.00	3.76	42.00	31.00	33.96	4.19	45.00	30.50
K	4.52	2.42	8.00	0.30	4.58	2.02	8.00	1.00	4.55	2.22	8.00	0.65
CO_2	14.80	1.96	18.70	12.10	14.89	1.95	18.80	12.70	14.85	1.96	18.75	12.40
F	0.44	0.17	0.64	0.16	0.45	0.17	0.82	0.17	0.44	0.17	0.73	0.17
MPN	420.08	505.10	1805.00	62.00	419.83	503.52	1800.00	63.00	419.96	504.31	1802.50	62.50

Table- 21

Physico-chemical Characteristics of River Paisuni

Station-P_4 | Period - 2006

Month	W. Temp. ^0C.	TUR. N.T.U.	W. C. Cum./Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.
Jan	17.70	3.10	64.60	8.20	25.00	144.00	169.00	185.00	20.10	9.07	1.01	12.60	0.04	0.06	0.21	0.18	18.40	33.00	4.00	14.20	0.16
Feb	21.20	4.10	81.70	8.46	22.00	145.00	167.00	190.00	16.00	8.40	1.20	13.07	0.06	0.06	0.25	0.23	15.35	34.00	3.00	15.40	0.24
Mar	23.20	4.70	66.20	7.79	20.00	155.00	172.00	240.00	17.61	6.00	1.96	13.20	0.05	0.07	0.28	0.21	20.54	32.00	2.00	17.80	0.36
Apr	28.10	5.20	48.10	7.75	18.00	152.00	170.00	267.00	22.10	5.03	2.10	14.92	0.05	0.07	0.35	0.24	31.18	34.00	4.00	18.70	0.44
May	33.40	5.30	70.90	8.10	19.00	151.00	170.00	278.00	28.90	6.05	2.12	15.01	0.06	0.08	0.59	0.34	30.22	34.00	4.00	13.40	0.54
Jun	35.20	5.70	178.40	8.20	13.00	173.00	186.00	271.00	32.40	5.90	2.30	16.00	0.06	0.08	0.36	0.41	31.41	35.00	5.00	14.20	0.64
Jul	30.10	6.30	784.40	8.53	14.00	165.00	179.00	182.00	30.24	6.79	1.40	14.79	0.05	0.09	0.25	0.42	24.56	36.00	6.00	13.40	0.51
Aug	30.20	4.90	1101.10	8.80	21.00	164.00	185.00	162.00	25.24	7.80	1.01	14.08	0.04	0.08	0.10	0.39	22.54	35.00	4.00	16.50	0.42
Sep	31.40	4.20	587.30	8.85	18.00	154.00	172.00	162.00	25.20	6.82	1.70	15.60	0.04	0.08	0.12	0.32	22.09	37.00	3.00	15.20	0.53
Oct	28.90	4.20	103.20	8.82	20.00	142.00	162.00	173.00	23.45	7.04	1.60	14.12	0.05	0.07	0.21	0.25	20.42	34.00	2.00	13.30	0.82
Nov	24.20	3.80	109.10	8.20	22.00	142.00	164.00	193.00	22.04	7.50	1.40	13.20	0.05	0.08	0.39	0.23	18.21	32.00	2.00	14.20	0.49
Dec	21.50	3.40	87.10	8.05	24.00	145.00	169.00	185.00	21.08	8.60	1.20	13.00	0.05	0.07	0.39	0.22	19.04	30.00	1.00	13.10	0.29

Table- 22

Matrix Showing Correlation of Coefficient among various Physico-Chemical Parameters

Station-P_4 Period - 2006

	W. Temp. °C.	TUR. N.T.U.	W. C. Cum./Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
W.T.	1																					
Tur	0.76	1																				
W.C.	0.40	0.39	1																			
PH	0.35	0.78	0.09	1																		
CO_3	-0.82	-0.90	-0.29	-0.65	1																	
HCO_3	0.67	0.79	0.57	0.66	-0.79	1																
T.A.	0.53	0.63	0.65	0.54	-0.58	0.95	1															
T.H.	0.34	0.47	-0.50	0.61	-0.41	0.28	0.15	1														
Cl.	0.86	0.70	0.41	0.41	-0.77	0.70	0.61	0.26	1													
D.O.	-0.68	-0.72	0.08	-0.62	0.74	0.46	-0.23	0.72	-0.43	1												
B.O.D.	0.62	0.56	-0.35	0.51	-0.66	0.36	0.14	0.84	0.42	-0.91	1											
C.O.D.	0.93	0.72	0.30	0.36	-0.87	0.67	0.51	0.38	0.81	-0.71	0.69	1										
NH_4-N	0.39	0.51	-0.44	0.52	-0.46	0.21	0.07	0.78	0.34	-0.49	0.64	0.37	1									
NO_2-N	0.79	0.57	0.53	0.32	-0.68	0.62	0.52	0.00	0.87	-0.35	0.31	0.70	0.11	1								
NO3-N	0.14	0.18	-0.59	0.40	-0.08	-0.13	-0.21	0.74	0.21	-0.34	0.51	0.09	0.78	0.06	1							
PO_4	0.84	0.80	0.70	0.45	-0.78	0.85	0.80	0.09	0.88	0.35	0.24	0.76	0.26	0.81	-0.05	1						
SO_4	0.77	0.74	0.04	0.61	-0.72	0.61	0.49	0.75	0.73	0.81	0.78	0.81	0.54	0.46	0.44	0.58	1					
Na.	0.67	0.57	0.60	0.04	-0.66	0.55	0.46	-0.10	0.55	-0.33	0.20	0.74	-0.02	0.46	0.43	0.70	0.38	1				
K	0.50	0.73	0.44	0.49	-0.66	0.70	0.66	0.25	0.66	-0.31	0.19	0.56	0.26	0.34	-0.05	0.71	0.59	0.69	1			
Free CO_2	-0.07	0.14	0.05	0.26	-0.03	0.16	0.15	0.26	0.39	-0.43	0.23	0.01	-0.14	0.40	-0.24	-0.19	0.16	0.06	0.00	1		
F	0.71	0.46	0.11	0.07	-0.61	0.25	0.06	0.13	0.62	-0.56	0.52	0.66	0.26	0.66	0.08	0.48	0.45	0.42	0.11	-0.25	1	
MPN	0.42	0.44	0.98	0.13	-0.29	0.57	0.65	-0.44	0.43	0.03	-0.33	0.28	0.38	0.51	-0.53	0.70	0.10	0.55	0.45	0.07	0.18	1

Table-24

Statistical Values of River Paisuni

Station-P_4

Parameter	2005				2006				Total			
	Mean	Std. Dev.	Max.	Min.	Mean	Std. Dev.	Max.	Min.	Mean	Std. Dev.	Max.	Min.
W.T.	27.32	7.08	36.30	18.10	24.59	5.20	35.20	17.70	25.96	6.14	35.75	17.90
Turbidity	4.57	0.87	6.12	3.20	4.58	0.91	6.30	3.10	4.57	0.89	6.21	3.15
Water current	274.90	337.36	1102.60	65.70	273.50	336.59	1101.10	64.60	274.20	336.98	1101.85	65.15
pH	8.31	0.37	8.84	7.76	8.31	0.36	8.85	7.75	8.31	0.37	8.85	7.76
CO_3	21.08	4.42	27.00	14.00	19.66	3.45	25.00	13.00	20.37	3.94	26.00	13.50
HCO_3	155.00	9.48	172.00	143.00	152.66	9.68	173.00	142.00	153.83	9.58	172.50	142.50
T.A.	175.41	5.60	188.00	170.00	172.00	7.24	185.00	162.00	173.71	6.42	186.50	166.00
T.H.	208.08	42.64	280.00	185.00	207.33	41.94	278.00	162.00	207.71	42.29	279.00	173.50
Cl	23.84	4.88	32.68	16.32	23.69	4.76	32.40	16.00	23.77	4.82	32.54	16.16
D.O.	7.25	1.07	9.08	5.92	7.08	1.18	9.07	5.03	7.17	1.13	9.08	5.48
B.O.D.	1.68	0.42	2.27	0.98	1.58	0.43	2.30	1.01	1.63	0.43	2.29	1.00
C.O.D.	14.15	1.09	15.99	12.51	14.13	1.08	16.00	12.60	14.14	1.09	16.00	12.56
NH_4-N	0.05	0.01	0.06	0.04	0.05	0.01	0.06	0.04	0.05	0.01	0.06	0.04
NO_2-N	0.07	0.01	0.08	0.06	0.07	0.01	0.08	0.06	0.07	0.01	0.08	0.06
NO_3-N	0.29	0.13	0.59	0.10	0.29	0.13	0.59	0.10	0.29	0.13	0.59	0.10
PO_4	0.28	0.09	0.42	0.18	0.29	0.08	0.42	0.18	0.28	0.09	0.42	0.18
SO_4	71.82	5.17	32.41	15.34	22.83	5.20	31.41	15.35	47.33	5.19	31.91	15.35
Na	33.66	2.32	39.00	31.00	33.83	1.82	36.00	30.00	33.75	2.07	37.50	30.50
K	3.66	1.65	6.00	1.00	3.33	1.37	6.00	1.00	3.50	1.51	6.00	1.00
CO_2	15.08	1.93	18.60	12.70	14.95	1.77	18.70	13.10	15.02	1.85	18.65	12.90
F	0.44	0.17	0.86	0.16	0.45	0.17	0.64	0.16	0.45	0.17	0.75	0.16
MPN	417.33	1634.24	1797.00	60.00	392.66	479.18	1690.00	55.00	405.00	1056.71	1743.50	57.50

Table- 24

Physico-chemical Characteristics of River Paisuni

Station-P_5																				Period - 2006	
Month	W. Temp. ^oC.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
Jan	18.50	6.10	135.20	8.40	28.00	146.00	174.00	183.00	20.40	9.04	1.01	12.57	0.05	0.07	0.21	0.18	16.60	33.00	4.00	15.42	0.16	65.00
Feb	22.70	4.70	137.80	8.10	26.00	152.00	178.00	190.00	16.33	8.40	1.46	13.06	0.05	0.06	0.25	0.23	20.18	35.00	3.00	16.08	0.26	85.00
Mar	24.50	4.90	143.50	8.20	21.00	154.00	175.00	240.00	17.96	6.20	2.13	13.58	0.05	0.07	0.28	0.24	22.60	34.00	3.00	17.64	0.40	125.00
Apr	27.80	5.04	104.20	8.40	20.00	157.00	177.00	269.00	21.01	6.05	2.17	14.98	0.06	0.08	0.35	0.22	26.15	34.00	5.00	18.65	0.45	176.00
May	33.60	5.72	102.10	8.30	20.00	157.00	177.00	282.00	27.91	6.07	2.18	15.10	0.05	0.08	0.59	0.34	24.52	35.00	6.00	13.41	0.52	185.00
Jun	35.70	6.04	201.50	8.20	16.00	172.00	188.00	273.00	32.65	5.90	2.30	15.92	0.05	0.08	0.36	0.42	24.01	35.00	5.00	14.52	0.62	274.00
Jul	30.10	7.64	830.80	8.40	15.00	171.00	186.00	182.00	35.30	7.04	1.70	14.71	0.05	0.08	0.25	0.39	28.40	37.00	6.00	13.56	0.52	1109.00
Aug	29.90	8.10	1101.20	8.50	21.00	168.00	189.00	155.00	34.06	7.70	1.09	14.08	0.04	0.09	0.10	0.34	23.40	40.00	4.00	13.25	0.32	1697.00
Sep	31.40	7.20	650.80	8.60	20.00	157.00	177.00	160.00	30.45	6.98	1.86	15.67	0.04	0.08	0.21	0.31	22.31	37.00	2.00	15.82	0.41	601.00
Oct	28.50	6.40	132.20	8.40	26.00	148.00	174.00	171.00	25.24	7.08	1.80	14.26	0.04	0.08	0.39	0.26	17.67	34.00	3.00	13.54	0.54	301.00
Nov	23.40	5.90	140.50	8.60	27.00	142.00	169.00	179.00	22.45	7.97	1.62	13.16	0.04	0.08	0.39	0.24	17.01	32.00	3.00	14.10	0.33	182.00
Dec	20.50	4.20	160.50	8.40	26.00	144.00	170.00	170.00	21.01	8.77	1.41	13.05	0.05	0.07	0.39	0.15	16.40	31.00	2.00	13.20	0.32	109.00

Table- 25

Matrix Showing Correlation of Coefficient among various Physico-Chemical Parameters

Station-P_5 | **Period - 2006**

	W. Temp. °C.	TUR. N.T.U.	W. C. Cum./ Sec.	pH	CO_3 p.p.m.	HCO_3 p.p.m.	T.A. p.p.m.	T.H. p.p.m.	Cl. p.p.m.	D.O. p.p.m.	B.O.D. p.p.m.	C.O.D. p.p.m.	NH_4-N p.p.m.	NO_2-N p.p.m.	NO_3-N p.p.m.	PO_4 p.p.m.	SO_4 p.p.m.	Na p.p.m.	K p.p.m.	Free CO_2 p.p.m.	F. p.p.m.	M.P.N. Org/l.
W.T.	1																					
Tur	0.49	1																				
W.C.	0.34	0.84	1																			
PH	-0.01	0.52	0.42	1																		
CO_3	0.81	-0.41	-0.45	0.13	1																	
HCO_3	0.76	0.57	0.62	-0.18	-0.91	1																
T.A.	0.66	0.61	0.67	-0.20	-0.75	0.96	1															
T.H.	0.42	-0.39	0.49	-0.54	-0.45	0.28	0.14	1														
Cl.	0.77	0.84	0.74	0.34	-0.71	0.78	0.74	0.08	1													
D.O.	-0.79	-0.09	0.03	0.21	0.75	-0.56	-0.37	-0.74	-0.35	1												
B.O.D.	0.63	-0.23	-0.35	0.30	-0.58	0.30	0.08	0.78	0.10	-0.91	1											
C.O.D.	0.94	-0.38	0.26	0.05	-0.82	0.70	0.54	0.45	0.68	-0.81	0.71	1										
NH_4-N	0.21	-0.50	-0.54	-0.48	-0.30	0.17	0.06	0.84	-0.23	-0.52	0.62	0.34	1									
NO_2-N	0.69	0.74	0.64	0.54	-0.54	0.55	0.51	-0.18	0.87	-0.36	0.14	0.65	-0.21	1								
NO3-N	0.22	-0.48	0.64	0.18	0.01	-0.26	-0.40	0.59	0.15	-0.37	0.59	0.20	0.47	-0.07	1							
PO_4	0.89	0.65	0.52	0.06	-0.83	0.87	0.82	0.26	0.86	-0.60	0.40	0.76	0.01	0.64	-0.01	1						
SO_4	0.70	0.36	0.44	0.17	0.92	0.85	0.71	0.48	0.55	-0.07	0.51	0.70	0.40	0.39	0.04	0.71	1					
Na.	0.60	0.79	0.85	0.10	-0.58	0.77	0.82	0.15	0.70	-0.27	-0.08	0.48	-0.28	0.54	-0.54	0.69	0.63	1				
K	0.52	0.28	0.12	0.23	-0.06	0.62	0.56	0.60	0.46	-0.50	0.32	0.43	0.51	0.23	0.27	0.50	0.72	0.31	1			
Free CO_2	-0.18	0.40	0.33	0.26	-0.05	-0.08	-0.15	0.39	0.53	-0.29	0.34	0.03	0.52	-0.48	0.18	-0.32	0.21	0.12	-0.09	1		
F	0.84	0.19	0.02	0.15	-0.72	0.56	0.39	0.51	0.55	-0.84	0.81	0.62	0.38	-0.60	0.48	0.70	0.58	0.20	0.47	-0.15	1	
MPN	0.39	0.84	0.97	0.38	-0.45	0.65	0.71	-0.41	0.76	-0.03	-0.32	0.25	-0.47	0.70	0.57	0.55	0.46	0.86	0.23	0.39	0.09	1

Table-27

Statistical Values of River Paisuni

Station-P_5

Parameter	2005				2006				Total			
	Mean	Std. Dev.	Max.	Min.	Mean	Std. Dev.	Max.	Min.	Mean	Std. Dev.	Max.	Min.
W.T.	27.07	4.96	35.60	18.40	27.23	5.09	357.00	18.50	27.15	5.03	196.30	18.45
Turbidity	5.79	1.20	8.00	4.10	6.00	1.15	8.10	4.20	5.89	1.18	8.05	4.15
Water current	331.70	346.74	1204.80	100.90	320.02	326.62	1101.20	102.10	325.86	336.68	1153.00	101.50
pH	8.30	0.26	8.64	8.00	8.38	0.15	8.60	8.10	8.34	0.21	8.62	8.05
CO_3	21.66	4.21	27.00	15.00	22.16	4.16	28.00	15.00	21.91	4.19	27.50	15.00
HCO_3	155.58	9.73	173.00	143.00	155.66	9.79	172.00	142.00	155.62	9.76	172.50	142.50
T.A.	177.25	6.47	190.00	172.00	177.83	6.28	189.00	169.00	177.54	6.38	189.50	170.50
T.H.	204.33	45.15	280.00	154.00	204.50	45.36	282.00	155.00	204.42	45.26	281.00	154.50
Cl	25.55	6.24	35.32	16.32	25.40	6.24	35.30	16.33	25.47	6.24	35.31	16.33
D.O.	7.26	1.07	9.09	5.93	7.27	1.06	9.04	5.90	7.27	1.07	9.07	5.92
B.O.D.	1.70	0.41	2.29	0.99	1.73	0.41	2.30	1.01	1.72	0.41	2.30	1.00
C.O.D.	14.16	1.09	15.99	12.52	14.18	1.06	15.92	12.57	14.17	1.08	15.96	12.55
NH_4-N	0.05	0.01	0.06	0.04	0.05	0.01	0.06	0.04	0.05	0.01	0.06	0.04
NO_2-N	0.07	0.21	0.09	0.06	0.08	0.01	0.09	0.06	0.07	0.11	0.09	0.06
NO_3-N	0.30	0.14	0.59	0.10	0.31	0.12	0.59	0.10	0.31	0.13	0.59	0.10
PO_4	0.26	0.08	0.40	0.13	0.28	0.08	0.42	0.15	0.27	0.08	0.41	0.14
SO_4	21.57	3.85	28.46	16.40	21.60	3.84	28.40	16.40	21.59	3.85	28.43	16.40
Na	34.25	2.68	41.00	31.00	34.75	2.31	40.00	31.00	34.50	2.50	40.50	31.00
K	3.75	1.53	6.00	1.00	3.83	1.34	6.00	2.00	3.79	1.44	6.00	1.50
CO_2	14.76	1.82	18.60	12.80	14.92	1.74	18.65	13.20	14.84	1.78	18.63	13.00
F	0.41	0.13	0.64	0.16	0.40	0.13	0.62	0.16	0.41	0.13	0.63	0.16
MPN	417.58	502.73	1797.00	61.00	409.08	480.07	1697.00	65.00	413.33	491.40	1747.00	63.00

Table-28

Monthly Variation in No. of Phytoplankton , Year 2005

Station No-P_1

Chlorophyceae	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chlorella	3	3	5	10	12	12	3	2	4	5	6	5
Ankistrodesmus	2	3	4	3	6	2	0	0	2	3	4	2
Spirogyra	18	20	16	17	20	22	6	2	4	5	4	8
Ulothrix	10	8	8	13	15	14	4	6	3	8	9	11
zygnema	3	2	4	8	10	12	3	2	1	4	6	8
Microspora	2	3	5	8	12	12	2	2	4	4	5	6
Scenedesmus	5	5	4	2	1	0	0	0	1	1	3	2
Eudorina	1	2	0	0	0	0	2	1	0	3	4	6
Pandorina	1	1	2	8	12	0	0	0	1	3	2	1
Pediastrum	6	6	10	18	18	20	15	16	6	9	4	3
Total	**51**	**53**	**58**	**87**	**106**	**94**	**35**	**31**	**26**	**45**	**47**	**52**
Becillariophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Navicula	10	10	8	9	10	12	6	3	0	2	4	8
Synebra	1	1	0	3	12	12	10	2	2	4	6	6
Tabellaria	2	2	4	8	6	8	1	2	5	4	4	5
Fragillaria	2	1	4	5	7	6	0	0	0	1	2	3
Cymbella	0	0	2	10	6	9	0	0	0	0	0	1
Nitzschia	8	4	5	7	10	8	1	0	2	8	12	4
Cyclotella	3	4	6	6	8	8	0	0	0	2	2	3
Astorionella	0	2	4	8	10	6	0	0	2	2	3	2
Pinnularia	6	4	4	4	0	0	0	1	2	5	4	4
Total	**32**	**28**	**37**	**60**	**69**	**69**	**18**	**8**	**13**	**28**	**37**	**36**
Cynophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Agmenellum	2	2	4	4	6	5	1	1	2	3	3	2
Rivularia	1	2	2	4	8	6	0	0	0	0	2	1
Anabaena	4	4	5	6	8	10	1	2	2	2	2	3
Oscillatoria	0	0	1	10	25	8	4	2	2	10	5	2
Microcystis	4	5	10	16	18	15	6	2	7	7	3	1
Gompospaeria	2	3	4	6	8	3	2	0	1	2	1	3
Total	**13**	**16**	**26**	**46**	**73**	**47**	**14**	**7**	**14**	**24**	**16**	**12**
Grand Total	**96**	**97**	**121**	**193**	**248**	**210**	**67**	**46**	**53**	**97**	**100**	**100**

Table-29

Monthly Variation in No. of Phytoplankton , Year 2005

Station No-P_2

Chlorophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Chlorella	5	7	9	12	12	14	4	4	5	8	6	4
Ankistrodesmus	8	4	3	10	14	18	2	0	1	3	4	4
Spirogyra	21	20	22	22	24	25	6	0	4	8	7	15
Ulothrix	18	11	14	17	15	10	0	0	5	6	8	9
zygnema	4	4	3	2	4	1	0	0	3	4	6	6
Microspora	2	2	5	7	8	12	2	2	5	5	6	6
Scenedesmus	7	7	9	12	22	21	6	7	8	9	10	4
Eudorina	1	4	0	0	0	2	4	5	6	6	3	2
Pandorina	5	6	10	12	14	15	6	5	7	8	12	4
Pediastrum	9	9	10	12	25	28	0	2	1	3	4	4
Total	**80**	**74**	**85**	**106**	**138**	**146**	**30**	**25**	**45**	**60**	**66**	**58**
Becillariophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Navicula	6	8	12	8	15	16	6	3	2	6	8	8
Synebra	1	1	2	9	10	15	2	0	0	4	6	6
Tabellaria	3	4	8	7	12	6	3	1	2	4	5	7
Fragillaria	2	3	5	6	8	9	0	1	0	2	4	6
Cymbella	1	0	5	6	14	15	0	0	0	0	0	1
Nitzschia	15	5	6	6	12	7	2	2	8	12	13	13
Cyclotella	0	1	5	7	6	8	0	0	3	4	4	2
Astorionella	0	0	2	3	6	8	5	2	0	0	2	4
Pinnularia	7	6	4	6	0	0	0	2	2	4	6	6
Total	**35**	**28**	**49**	**58**	**83**	**84**	**18**	**11**	**17**	**36**	**48**	**53**
Cynophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Agmenellum	2	3	4	5	7	8	5	0	0	3	4	3
Rivularia	1	2	3	3	4	2	0	0	0	0	1	2
Anabaena	5	4	6	8	10	12	1	0	2	4	6	5
Oscillatoria	1	0	0	0	10	12	1	1	2	4	6	5
Microcystis	2	2	4	8	10	12	10	3	2	4	5	3
Gompospaeria	4	4	3	4	8	10	2	1	0	3	2	1
Total	**15**	**15**	**20**	**28**	**49**	**56**	**19**	**5**	**6**	**18**	**24**	**19**
Grand Total	**130**	**117**	**154**	**192**	**270**	**286**	**67**	**41**	**68**	**114**	**138**	**130**

Monthly Variation in No. of Phytoplankton , Year 2005

Station No-P_3

Chlorophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Chlorella	4	6	5	12	12	12	2	1	4	5	5	4
Ankistrodesmus	6	5	2	10	14	16	2	0	2	3	5	5
Spirogyra	20	22	24	20	20	24	3	1	4	6	14	15
Ulothrix	16	10	14	14	15	12	0	0	3	4	6	8
zygnema	3	4	2	2	1	1	0	0	0	3	4	2
Microspora	3	1	4	7	9	13	4	2	1	7	8	8
Scenedesmus	8	6	9	10	12	15	2	1	0	4	8	9
Eudorina	1	4	1	2	0	0	2	2	4	5	6	3
Pandorina	4	7	9	11	12	12	4	2	4	8	10	12
Pediastrum	9	8	8	7	11	12	0	1	2	8	8	5
Total	**74**	**73**	**78**	**95**	**106**	**117**	**19**	**10**	**24**	**53**	**74**	**71**
Becillariophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Navicula	5	4	15	15	20	25	2	1	8	12	14	14
Synebra	2	2	4	8	9	10	1	0	0	5	8	6
Tabellaria	6	5	6	8	10	12	2	0	1	3	6	7
Fragillaria	2	4	4	6	8	6	1	2	0	0	0	1
Cymbella	0	1	2	5	12	12	0	0	0	0	0	0
Nitzschia	7	4	6	6	10	8	1	1	7	12	12	11
Cyclotella	2	1	4	8	5	7	0	0	3	5	5	3
Astorionella	0	1	2	4	7	9	4	1	0	0	3	5
Pinnularia	6	5	4	5	0	1	0	2	2	5	5	7
Total	**30**	**27**	**47**	**65**	**81**	**90**	**11**	**7**	**21**	**42**	**53**	**54**
Cynophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Agmenellum	3	4	5	6	8	9	6	1	0	3	5	4
Rivularia	2	2	2	4	6	1	0	0	0	0	2	3
Anabaena	4	4	7	8	11	10	0	1	0	5	8	6
Oscillatoria	2	0	0	1	9	14	2	2	3	5	5	7
Microcystis	2	3	3	9	11	13	9	4	3	5	7	3
Gompospaeria	5	5	4	5	9	10	3	2	1	4	4	2
Total	**18**	**18**	**21**	**33**	**54**	**57**	**20**	**10**	**7**	**22**	**31**	**25**
Grand Total	**122**	**118**	**146**	**193**	**241**	**264**	**50**	**27**	**52**	**117**	**158**	**150**

Table-31

Monthly Variation in No. of Phytoplankton , Year 2005

Station No-P_4

Chlorophyceae	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chlorella	3	7	6	13	12	13	2	1	5	6	6	5
Ankistrodesmus	8	6	3	10	15	17	3	1	3	3	6	7
Spirogyra	21	21	25	26	24	25	4	2	3	7	15	15
Ulothrix	18	12	14	18	14	27	0	0	6	12	11	7
zygnema	4	5	6	2	5	0	0	0	2	5	7	5
Microspora	4	5	6	6	10	13	1	2	5	6	8	6
Scenedesmus	10	7	11	12	12	16	2	1	0	5	7	10
Eudorina	2	6	0	0	0	0	0	1	5	6	8	5
Pandorina	5	8	11	12	14	14	5	3	5	9	11	12
Pediastrum	8	8	5	8	10	25	0	1	2	7	7	5
Total	**83**	**85**	**87**	**107**	**116**	**150**	**17**	**12**	**36**	**66**	**86**	**77**
Becillariophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Navicula	4	5	16	17	21	24	2	0	9	13	15	15
Synebra	3	3	5	7	12	12	1	1	0	6	8	8
Tabellaria	7	4	5	8	12	14	0	0	0	1	4	5
Fragillaria	0	0	3	6	10	15	2	0	0	0	0	0
Cymbella	1	1	5	5	14	12	0	0	0	0	0	1
Nitzschia	5	8	8	10	0	0	0	3	8	5	4	4
Cyclotella	4	6	7	7	8	10	4	2	1	3	6	8
Astorionella	1	5	7	6	10	10	2	2	3	6	6	2
Pinnularia	4	6	7	8	11	11	3	5	10	10	8	8
Total	**29**	**38**	**63**	**74**	**98**	**108**	**14**	**13**	**31**	**44**	**51**	**51**
Cynophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Agmenellum	3	5	8	8	8	10	0	0	0	5	4	5
Rivularia	4	6	8	7	7	11	0	0	0	0	0	1
Anabaena	5	7	8	9	10	12	2	2	4	6	5	4
Oscillatoria	0	0	0	0	11	22	5	5	2	5	4	3
Microcystis	4	4	5	10	12	15	10	4	3	6	7	8
Gompospaeria	6	6	6	8	10	12	3	2	2	3	6	7
Total	**22**	**28**	**35**	**42**	**58**	**82**	**20**	**13**	**11**	**25**	**26**	**28**
Grand Total	**134**	**151**	**185**	**223**	**272**	**340**	**51**	**38**	**78**	**135**	**163**	**156**

Table-32

Monthly Variation in No. of Phytoplankton , Year 2005

Station No-P_5

Chlorophyceae	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chlorella	4	8	7	14	14	16	2	3	6	8	7	6
Ankistrodesmus	7	7	4	11	14	20	1	0	4	5	7	7
Spirogyra	18	20	22	24	24	25	o	0	4	8	9	7
Ulothrix	20	12	15	18	16	26	o	0	7	13	12	8
zygnema	3	6	8	3	6	0	o	0	3	5	6	3
Microspora	4	7	8	9	12	14	2	1	4	5	8	5
Scenedesmus	8	7	5	6	12	16	4	5	6	8	10	7
Eudorina	1	3	o	0	0	0	1	2	4	6	6	3
Pandorina	4	6	7	8	10	12	12	3	2	5	9	7
Pediastrum	8	8	6	9	11	22	0	1	3	6	7	8
Total	**73**	**80**	**82**	**102**	**119**	**151**	**22**	**15**	**43**	**69**	**81**	**61**
Becillariophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Navicula	5	6	15	18	20	22	1	0	5	4	14	14
Synebra	2	2	4	6	11	12	0	0	1	5	9	8
Tabellaria	8	5	5	10	13	15	1	1	0	2	5	6
Fragillaria	2	4	6	6	8	10	0	0	0	0	2	2
Cymbella	0	0	5	6	11	18	1	1	0	1	0	0
Nitzschia	8	9	10	12	1	0	1	4	7	5	5	6
Cyclotella	3	5	6	7	8	10	2	0	2	3	6	4
Astorionella	2	6	8	7	11	13	3	3	4	6	9	7
Pinnularia	5	7	9	10	13	12	4	5	9	9	8	9
Total	**35**	**44**	**68**	**82**	**96**	**112**	**13**	**14**	**28**	**43**	**58**	**56**
Cynophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Agmenellum	4	8	10	10	9	12	0	1	0	6	5	4
Rivularia	5	5	10	8	8	12	1	0	1	1	0	2
Anabaena	5	8	8	10	12	11	2	1	5	7	6	3
Oscillatoria	0	0	1	0	10	24	4	6	1	8	5	3
Microcystis	6	5	6	11	15	16	8	3	1	3	5	9
Gompospaeria	7	8	7	9	11	10	2	2	4	3	8	8
Total	**27**	**34**	**42**	**48**	**65**	**85**	**17**	**13**	**12**	**28**	**29**	**29**
Grand Total	**135**	**158**	**192**	**232**	**280**	**348**	**52**	**42**	**83**	**140**	**168**	**146**

Table-33

Monthly Variation in No. of Phytoplankton , Year 2006

Station No-P_1

Chlorophyceae	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chlorella	4	3	6	10	13	14	2	1	4	5	6	4
Ankistrodesmus	2	3	5	4	6	3	0	0	2	3	5	3
Spirogyra	16	20	15	17	19	22	4	2	4	6	5	8
Ulothrix	11	9	8	12	14	15	3	5	3	7	8	10
zygnema	4	3	5	8	8	10	2	0	1	4	6	7
Microspora	2	3	6	8	12	13	1	1	4	5	6	5
Scenedesmus	5	5	6	5	1	1	0	0	2	1	3	3
Eudorina	2	3	1	0	0	0	1	2	0	5	5	4
Pandorina	1	1	3	7	10	0	0	1	2	4	3	2
Pediastrum	5	5	10	17	18	20	16	16	7	10	4	4
Total	**52**	**55**	**65**	**88**	**101**	**98**	**29**	**28**	**29**	**50**	**51**	**50**
Becillariophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Navicula	10	10	9	9	11	12	6	4	0	1	5	7
Synebra	2	2	0	4	12	13	10	3	1	3	6	5
Tabellaria	2	2	4	9	7	9	0	1	4	3	5	6
Fragillaria	3	2	3	6	7	6	0	1	0	2	3	4
Cymbella	1	0	1	9	8	10	1	1	0	0	0	0
Nitzschia	9	5	5	8	10	9	0	0	3	9	11	3
Cyclotella	3	4	6	5	7	10	0	0	0	1	3	4
Astorionella	0	1	3	7	8	8	1	1	1	2	3	4
Pinnularia	7	3	3	4	0	1	0	1	2	4	3	3
Total	**37**	**29**	**34**	**61**	**70**	**78**	**18**	**12**	**11**	**25**	**39**	**36**
Cynophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Agmenellum	3	3	3	6	8	6	1	1	1	3	4	3
Rivularia	2	4	4	7	10	8	0	1	1	1	3	2
Anabaena	3	3	4	5	7	9	0	2	2	1	1	3
Oscillatoria	0	0	2	10	20	7	4	2	3	9	6	3
Microcystis	4	4	9	18	16	16	6	2	6	8	4	2
Gompospaeria	2	4	5	8	7	2	2	1	5	1	2	4
Total	**14**	**18**	**27**	**54**	**68**	**48**	**13**	**9**	**18**	**23**	**20**	**17**
Grand Total	**103**	**102**	**126**	**203**	**239**	**224**	**60**	**49**	**58**	**98**	**110**	**103**

Table-34

Monthly Variation in No. of Phytoplankton , Year 2006

Station No-P_2

Chlorophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Chlorella	4	6	10	11	12	15	3	2	4	8	7	3
Ankistrodesmus	7	3	4	9	14	18	1	0	2	3	4	5
Spirogyra	22	19	21	20	23	24	6	0	5	8	8	15
Ulothrix	17	12	13	17	15	12	1	0	4	7	8	10
zygnema	5	4	4	3	3	0	0	0	2	5	6	5
Microspora	3	3	4	6	10	13	1	2	6	6	7	6
Scenedesmus	6	6	10	11	20	22	7	8	6	7	11	3
Eudorina	2	3	0	1	0	1	3	6	7	7	4	3
Pandorina	6	7	10	12	12	16	4	4	7	8	12	5
Pediastrum	10	8	9	10	20	27	0	2	2	4	4	4
Total	**82**	**71**	**85**	**100**	**129**	**148**	**26**	**24**	**45**	**63**	**71**	**59**
Becillariophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Navicula	5	7	12	9	12	17	5	2	3	5	7	7
Synebra	0	0	2	10	10	14	3	0	0	5	5	7
Tabellaria	4	5	3	8	10	16	2	0	0	5	5	6
Fragillaria	3	4	7	8	11	8	2	2	3	4	6	5
Cymbella	0	0	6	6	13	16	0	0	0	0	0	0
Nitzschia	14	6	4	8	12	8	1	3	7	11	12	12
Cyclotella	0	2	4	8	6	8	0	0	2	3	5	3
Astorionella	1	2	3	4	7	6	4	1	1	1	3	5
Pinnularia	8	7	5	7	1	0	0	3	3	5	7	5
Total	**35**	**33**	**46**	**68**	**82**	**93**	**17**	**11**	**19**	**39**	**50**	**50**
Cynophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Agmenellum	3	2	3	6	4	7	4	0	0	3	5	2
Rivularia	2	3	3	4	4	3	0	1	0	0	2	2
Anabaena	4	5	5	7	9	11	2	0	2	5	5	4
Oscillatoria	2	0	0	0	10	12	2	2	2	4	8	5
Microcystis	3	4	4	7	11	13	5	3	2	3	6	3
Gompospaeria	5	4	3	5	8	11	4	1	0	4	3	2
Total	**19**	**18**	**18**	**29**	**46**	**57**	**17**	**7**	**6**	**19**	**29**	**18**
Grand Total	**136**	**122**	**149**	**197**	**257**	**298**	**60**	**42**	**70**	**121**	**150**	**127**

Table-35

Monthly Variation in No. of Phytoplankton , Year 2006

Station No-P_3

Chlorophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Chlorella	5	6	6	14	12	13	1	0	3	6	6	5
Ankistrodesmus	5	4	3	11	15	13	1	0	2	4	5	5
Spirogyra	21	21	23	21	20	22	2	2	3	5	12	14
Ulothrix	17	11	13	15	16	14	0	0	4	3	7	6
zygnema	4	3	3	3	10	13	3	2	0	4	3	3
Microspora	3	2	5	8	12	16	2	2	0	8	7	6
Scenedesmus	7	5	8	9	11	13	1	1	0	5	7	6
Eudorina	2	3	0	3	0	1	1	2	3	5	8	2
Pandorina	3	7	7	10	13	12	3	3	3	7	9	10
Pediastrum	8	6	7	6	8	10	0	1	1	6	8	6
Total	**75**	**68**	**75**	**100**	**117**	**127**	**14**	**13**	**19**	**53**	**72**	**63**
Becillariophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Navicula	4	5	12	13	18	23	1	1	5	13	13	12
Synebra	3	1	6	9	8	11	0	0	2	6	8	7
Tabellaria	7	4	7	7	9	11	3	0	2	2	5	6
Fragillaria	3	3	3	5	8	7	1	0	0	0	0	0
Cymbella	0	0	2	4	13	11	0	1	0	0	0	0
Nitzschia	6	4	5	4	10	9	0	0	6	11	12	10
Cyclotella	2	0	5	4	8	0	2	2	4	5	5	4
Astorionella	0	1	3	6	8	5	2	2	0	2	4	2
Pinnularia	5	4	6	0	3	1	3	0	6	4	4	4
Total	**30**	**22**	**49**	**52**	**85**	**78**	**12**	**6**	**25**	**43**	**51**	**45**
Cynophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Agmenellum	4	3	6	5	7	8	7	0	0	2	3	5
Rivularia	1	3	2	3	7	0	0	0	0	0	2	3
Anabaena	3	5	6	7	10	9	1	1	0	4	7	5
Oscillatoria	3	0	0	0	8	15	1	2	2	5	4	6
Microcystis	1	2	4	8	10	12	8	3	3	4	8	2
Gompospaeria	4	4	4	5	8	10	2	1	2	3	3	2
Total	**16**	**17**	**22**	**28**	**50**	**54**	**19**	**7**	**7**	**18**	**27**	**23**
Grand Total	**121**	**107**	**146**	**180**	**252**	**259**	**45**	**26**	**51**	**114**	**150**	**131**

Table-36

Monthly Variation in No. of Phytoplankton , Year 2006

Station No-P_4

Chlorophyceae	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chlorella	2	6	8	12	14	15	1	0	5	7	8	8
Ankistrodesmus	7	5	4	12	12	15	3	2	4	4	7	8
Spirogyra	20	19	22	24	20	20	2	1	3	8	12	12
Ulothrix	20	10	12	16	15	25	0	0	5	10	12	5
zygnema	3	5	8	4	6	0	0	1	4	4	8	4
Microspora	5	6	7	7	12	14	1	4	4	8	7	5
Scenedesmus	10	8	12	10	13	16	3	2	0	6	7	10
Eudorina	3	6	0	0	0	0	0	1	4	8	7	6
Pandorina		7	10	13	12	15	4	2	4	10	11	12
Pediastrum	7	8	4	9	9	23	0	2	1	8	8	4
Total	**81**	**80**	**87**	**107**	**113**	**143**	**14**	**15**	**34**	**73**	**87**	**74**
Becillariophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Navicula	3	4	15	18	20	25	1	0	5	12	16	14
Synebra	3	3	6	8	12	13	1	2	1	6	8	8
Tabellaria	6	4	6	7	13	15	0	0	0	0	4	6
Fragillaria	0	0	3	6	9	14	1	0	0	0	0	0
Cymbella	2	2	4	4	13	13	0	0	0	0	0	0
Nitzschia	4	8	7	9	0	0	0	5	7	6	3	2
Cyclotella	3	4	8	5	7	12	3	2	2	4	8	5
Astorionella	2	5	7	7	9	11	2	2	3	5	7	2
Pinnularia	5	7	8	8	10	10	2	6	11	12	7	10
Total	**28**	**37**	**49**	**72**	**93**	**113**	**10**	**17**	**29**	**45**	**53**	**47**
Cynophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Agmenellum	4	6	10	8	9	12	0	0	0	4	3	6
Rivularia	4	7	8	6	7	11	0	0	0	0	0	2
Anabaena	5	8	7	10	9	12	1	2	4	6	5	4
Oscillatoria	1	0	0	0	11	20	4	5	3	6	3	2
Microcystis	6	4	6	10	12	16	11	8	4	7	7	8
Gompospaeria	3	7	6	9	10	12	4	2	2	3	5	6
Total	**23**	**32**	**37**	**43**	**58**	**83**	**20**	**17**	**13**	**26**	**23**	**28**
Grand Total	**132**	**149**	**173**	**222**	**264**	**339**	**44**	**49**	**76**	**144**	**163**	**149**

Table-37

Monthly Variation in No. of Phytoplankton , Year 2006

Station No-P_5

Chlorophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Chlorella	2	6	8	12	14	15	1	2	7	7	8	7
Ankistrodesmus	8	8	5	10	12	21	2	0	5	7	6	7
Spirogyra	15	19	20	25	22	24	0	0	5	8	10	6
Ulothrix	20	13	16	19	17	25	0	0	8	12	13	7
zygnema	4	7	9	4	7	0	0	0	4	4	7	2
Microspora	3	7	7	10	12	15	2	2	3	4	7	6
Scenedesmus	6	8	4	7	13	16	3	3	5	7	9	6
Eudorina	2	2	0	0	0	0	1	2	3	4	7	2
Pandorina	5	7	6	7	9	11	10	10	1	6	8	6
Pediastrum	7	7	5	8	10	20	0	1	2	5	6	7
Total	**72**	**84**	**80**	**102**	**116**	**147**	**19**	**20**	**43**	**64**	**81**	**56**
Becillariophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Navicula	4	4	14	20	20	21	1	0	6	10	12	13
Synebra	1	1	2	8	10	13	0	0	2	4	8	7
Tabellaria	7	4	4	9	10	15	2	2	0	3	4	5
Fragillaria	1	3	4	5	9	9	0	0	0	0	3	3
Cymbella	0	0	4	4	10	15	2	0	1	2	0	0
Nitzschia	7	10	9	14	0	0	0	3	6	6	5	8
Cyclotella	4	6	7	8	7	9	2	0	3	4	3	5
Astorionella	1	5	7	8	10	13	2	3	5	7	8	6
Pinnularia	4	5	6	9	12	11	4	6	8	8	7	10
Total	**29**	**38**	**57**	**85**	**88**	**106**	**13**	**14**	**31**	**44**	**50**	**57**
Cynophyceae	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Agmenellum	5	6	12	12	8	10	0	2	0	7	6	3
Rivularia	6	5	12	8	8	12	0	0	3	0	0	3
Anabaena	6	6	8	11	15	10	2	2	4	8	8	6
Oscillatoria	0	9	0	0	10	22	4	4	0	5	8	3
Microcystis	7	4	5	10	15	18	8	5	0	4	4	10
Gompospaeria	8	9	3	7	12	10	3	3	3	4	4	7
Total	**32**	**39**	**40**	**48**	**68**	**82**	**17**	**16**	**10**	**28**	**30**	**32**
Grand Total	**133**	**161**	**177**	**235**	**272**	**335**	**49**	**50**	**84**	**136**	**161**	**145**

Table-38

Monthly Variation in No. of Zooplankton , Year 2005

Station P_1

Protozoa	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Euglena	1	5	12	14	16	18	0	0	2	5	5	0
Arcella	2	2	5	5	8	10	1	1	3	3	4	2
Verticella	1	2	3	5	6	11	0	0	0	0	2	2
Paramecium	3	4	4	5	5	8	2	2	3	3	4	2
Acanphocystis	4	6	6	11	14	16	0	0	2	4	6	3
Total	**11**	**19**	**30**	**40**	**49**	**63**	**3**	**3**	**10**	**15**	**21**	**9**
Rotifera	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Brachionus	19	7	10	16	21	23	4	2	6	8	12	14
Keratella	0	0	0	0	0	7	5	5	3	11	2	0
Philodina	3	5	5	8	13	16	3	3	5	7	6	4
Asplanchna	4	6	17	20	20	21	1	0	2	15	15	3
Total	**26**	**18**	**32**	**44**	**54**	**67**	**13**	**10**	**16**	**41**	**35**	**21**
Crustacea	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
a-Cladocera												
Alona	1	3	3	5	6	8	2	2	3	5	5	2
Daphnia	8	21	25	30	35	9	0	0	0	11	12	12
Oxyurella	3	8	9	10	12	8	6	3	3	5	6	5
Moina	6	11	15	20	22	15	5	4	2	3	6	2
Total	**18**	**43**	**52**	**65**	**75**	**40**	**13**	**9**	**8**	**24**	**29**	**21**
b- Copepoda												
Cyclops	6	5	8	25	30	20	22	4	6	14	32	35
Mesocyclops	0	0	0	11	6	5	0	0	6	15	15	0
Ergasilus	5	3	3	5	4	3	0	0	3	4	6	6
Allodiaptomos	6	8	7	13	13	5	4	3	5	7	10	6
Total	**17**	**16**	**18**	**54**	**53**	**33**	**26**	**7**	**20**	**40**	**63**	**47**
Grand Total	**72**	**96**	**132**	**203**	**231**	**203**	**55**	**29**	**54**	**120**	**148**	**98**

Table-39

Monthly Variation in No. of Zooplankton , Year 2005

Station P_2

Protozoa	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Euglena	2	5	12	16	18	20	0	0	4	5	6	0
Arcella	2	3	4	6	7	10	2	1	3	3	4	2
Verticella	2	3	4	6	7	13	0	0	0	0	3	2
Paramecium	4	4	5	6	8	12	2	3	4	6	5	3
Acanphocystis	3	7	7	12	14	15	18	16	6	3	7	4
Total	**13**	**22**	**32**	**46**	**54**	**70**	**22**	**20**	**17**	**17**	**25**	**11**
Rotifera	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Brachionus	18	7	12	16	21	22	3	1	4	8	14	16
Keratella	0	0	0	0	0	7	5	3	2	14	2	1
Philodina	3	4	4	10	14	16	2	1	4	5	4	3
Asplanchna	4	11	15	20	22	22	3	2	7	10	15	4
Total	**25**	**22**	**31**	**46**	**57**	**67**	**13**	**7**	**17**	**37**	**35**	**24**
Crustacea	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
a-Cladocera												
Alona	2	3	6	6	7	1	1	3	6	6	7	3
Daphnia	6	20	24	35	40	6	0	0	0	6	12	12
Oxyurella	3	6	10	10	10	12	3	2	4	5	5	3
Moina	7	8	10	20	21	16	3	3	1	4	5	2
Total	**18**	**37**	**50**	**71**	**78**	**35**	**7**	**8**	**11**	**21**	**29**	**20**
b- Copepoda												
Cyclops	7	6	7	24	28	18	20	4	4	16	30	31
Mesocyclops	0	0	0	10	5	4	0	0	3	16	13	0
Ergasilus	5	3	4	4	3	2	0	0	3	5	7	8
Allodiaptomos	7	8	8	10	12	7	4	4	6	8	6	4
Total	**19**	**17**	**19**	**48**	**48**	**31**	**24**	**8**	**16**	**45**	**56**	**43**
Grand Total	**75**	**98**	**132**	**211**	**237**	**203**	**66**	**43**	**61**	**120**	**145**	**98**

Table-40

Monthly Variation in No. of Zooplankton , Year 2005

Station No-P_3

Protozoa	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Euglena	3	5	11	12	15	18	0	0	3	5	7	6
Arcella	2	2	6	6	7	10	2	1	4	2	3	2
Verticella	2	4	4	7	7	10	0	0	0	0	3	3
Paramecium	4	4	5	8	11	13	1	2	2	4	5	4
Acanphocystis	2	6	6	10	15	16	15	14	5	4	7	5
Total	**13**	**21**	**32**	**43**	**55**	**67**	**18**	**17**	**14**	**15**	**25**	**20**
Rotifera	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Brachionus	12	5	10	12	18	20	2	1	5	7	14	14
Keratella	2	4	6	10	14	13	2	3	4	6	7	5
Philodina	3	4	5	10	12	15	2	2	4	6	4	4
Asplanchna	4	10	15	20	22	23	3	6	9	12	14	7
Total	**21**	**23**	**36**	**52**	**66**	**71**	**9**	**12**	**22**	**31**	**39**	**30**
Crustacea	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
a-Cladocera												
Alona	3	3	4	5	6	3	2	0	3	3	4	2
Daphnia	5	15	20	25	30	6	0	0	0	9	9	12
Oxyurella	3	5	10	10	11	12	3	2	6	5	6	4
Moina	2	2	4	5	6	6	0	1	2	4	5	3
Total	**13**	**25**	**38**	**45**	**53**	**27**	**5**	**3**	**11**	**21**	**24**	**21**
b- Copepoda												
Cyclops	6	5	7	22	25	20	15	4	4	12	18	25
Mesocyclops	0	0	0	8	6	4	0	0	5	8	16	0
Ergasilus	4	3	4	4	3	2	0	0	2	4	7	3
Allodiaptomos	5	7	8	8	9	8	3	2	15	7	4	4
Total	**15**	**15**	**19**	**42**	**43**	**34**	**18**	**6**	**26**	**31**	**45**	**32**
Grand Total	**62**	**84**	**125**	**182**	**217**	**199**	**50**	**38**	**73**	**98**	**133**	**103**

Table-41

Monthly Variation in No. of Zooplankton , Year 2005

Station No-P_4

Protozoa	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Euglena	4	4	10	12	16	18	0	0	4	4	5	3
Arcella	4	4	7	7	8	10	2	1	4	6	5	3
Verticella	2	2	5	5	6	10	0	0	0	0	0	0
Paramecium	3	3	4	8	10	10	2	1	3	4	6	4
Acanphocystis	3	5	5	7	9	12	10	14	5	8	7	4
Total	**16**	**18**	**31**	**39**	**49**	**60**	**14**	**16**	**16**	**22**	**23**	**14**
Rotifera	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Brachionus	14	5	10	15	18	21	3	1	4	9	12	13
Keratella	0	0	0	0	0	7	5	5	3	12	2	0
Philodina	3	5	6	10	15	17	4	3	5	6	8	4
Asplanchna	4	5	15	18	22	25	4	3	7	10	15	6
Total	**21**	**15**	**31**	**43**	**55**	**70**	**16**	**12**	**19**	**37**	**37**	**23**
Crustacea	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
a-Cladocera												
Alona	3	3	5	7	6	4	2	1	3	4	6	3
Daphnia	8	18	22	30	33	8	0	0	0	10	8	9
Oxyurella	4	4	6	8	8	12	3	1	4	4	6	2
Moina	4	6	10	18	20	12	4	3	1	2	2	2
Total	**19**	**31**	**43**	**63**	**67**	**36**	**9**	**5**	**8**	**20**	**22**	**16**
b- Copepoda												
Cyclops	3	5	8	20	25	18	21	4	5	10	20	31
Mesocyclops	0	0	0	8	16	3	0	0	3	12	12	0
Ergasilus	3	4	5	4	8	2	0	0	3	6	8	4
Allodiaptomos	4	8	10	10	11	12	4	2	5	8	4	3
Total	**10**	**17**	**23**	**42**	**60**	**35**	**25**	**6**	**16**	**36**	**44**	**38**
Grand Total	**66**	**81**	**128**	**187**	**231**	**201**	**64**	**39**	**59**	**115**	**126**	**91**

Table-42

Monthly Variation in No. of Zooplankton , Year 2005

Station No-P_5

Protozoa	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Euglena	4	6	8	10	12	17	0	0	3	5	7	4
Arcella	2	3	6	6	8	10	1	1	3	5	6	4
Verticella	3	3	5	7	10	12	0	0	0	0	0	0
Paramecium	4	5	7	8	11	12	2	1	3	7	7	3
Acanphocystis	2	3	4	8	12	15	16	10	12	4	7	6
Total	**15**	**20**	**30**	**39**	**53**	**66**	**19**	**12**	**21**	**21**	**27**	**17**
Rotifera	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Brachionus	15	5	9	15	18	18	2	1	3	5	10	12
Keratella	0	0	0	0	0	6	3	4	2	12	2	0
Philodina	2	3	5	10	15	15	4	3	6	6	8	3
Asplanchna	3	6	12	17	20	22	25	2	4	8	12	6
Total	**20**	**14**	**26**	**42**	**53**	**61**	**34**	**10**	**15**	**31**	**32**	**21**
Crustacea	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
a-Cladocera												
Alona	3	4	8	8	7	3	2	1	4	5	7	4
Daphnia	6	24	22	28	30	10	0	0	0	10	10	12
Oxyurella	4	5	10	11	12	12	2	2	7	8	8	4
Moina	5	10	13	22	21	14	3	3	1	3	7	3
Total	**18**	**43**	**53**	**69**	**70**	**39**	**7**	**6**	**12**	**26**	**32**	**23**
b- Copepoda												
Cyclops	5	5	9	22	25	20	21	5	5	12	20	22
Mesocyclops	0	0	0	10	4	4	0	0	6	15	14	0
Ergasilus	4	3	7	7	9	6	3	1	3	6	6	4
Allodiaptomos	4	7	8	11	12	12	2	1	6	7	8	4
Total	**13**	**15**	**24**	**50**	**50**	**42**	**26**	**7**	**20**	**40**	**48**	**30**
Grand Total	**66**	**92**	**133**	**200**	**226**	**208**	**86**	**35**	**68**	**118**	**139**	**91**

Table-43

Monthly Variation in No. of Zooplankton , Year 2006

Station No-P_1

Protozoa	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Euglena	4	5	8	10	12	15	0	0	3	5	7	4
Arcella	1	3	4	5	8	8	1	1	2	3	3	3
Verticella	2	4	5	7	10	12	0	0	0	0	0	0
Paramecium	4	5	6	8	10	12	2	1	4	7	7	4
Acanphocystis	3	4	5	8	10	15	18	10	10	6	7	7
Total	**14**	**21**	**28**	**38**	**50**	**62**	**21**	**12**	**19**	**21**	**24**	**18**
Rotifera	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Brachionus	15	5	10	15	18	18	2	1	4	6	10	12
Keratella	0	0	0	0	0	7	4	3	2	8	2	0
Philodina	3	4	6	8	12	12	4	3	6	7	8	4
Asplanchna	3	7	12	15	20	22	25	2	4	8	12	6
Total	**21**	**16**	**28**	**38**	**50**	**59**	**35**	**9**	**16**	**29**	**32**	**22**
Crustacea	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
a-Cladocera												
Alona	1	2	2	4	5	7	1	1	3	4	4	2
Daphnia	8	18	20	25	35	9	0	0	0	9	11	12
Oxyurella	3	9	10	11	12	8	6	2	3	4	6	5
Moina	6	10	12	20	18	15	4	2	1	3	5	2
Total	**18**	**39**	**44**	**60**	**70**	**39**	**11**	**5**	**7**	**20**	**26**	**21**
b- Copepoda												
Cyclops	5	6	8	20	25	19	20	4	5	12	20	25
Mesocyclops	7	6	9	10	12	16	4	3	7	8	9	7
Ergasilus	4	2	3	4	3	2	0	0	3	4	6	6
Allodiaptomos	6	8	6	10	11	5	3	2	5	9	9	6
Total	**22**	**22**	**26**	**44**	**51**	**42**	**27**	**9**	**20**	**33**	**44**	**44**
Grand Total	**75**	**98**	**126**	**180**	**221**	**202**	**94**	**35**	**62**	**103**	**126**	**105**

Table-44

Monthly Variation in No. of Zooplankton , Year 2006

Station No-P_2

Protozoa	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Euglena	1	5	12	14	15	20	0	0	4	7	7	0
Arcella	2	2	4	6	6	8	2	1	3	3	4	3
Verticella	2	3	4	6	8	12	0	0	0	0	2	2
Paramecium	5	4	5	6	7	12	2	2	4	5	5	2
Acanphocystis	3	7	8	12	14	16	18	15	7	4	8	3
Total	**13**	**21**	**33**	**44**	**50**	**68**	**22**	**18**	**18**	**19**	**26**	**10**
Rotifera	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Brachionus	15	7	10	14	20	21	3	1	3	8	12	15
Keratella	0	0	0	0	0	7	5	4	3	12	3	0
Philodina	5	6	7	10	12	16	3	1	3	5	3	4
Asplanchna	4	8	14	18	20	21	3	2	8	11	14	3
Total	**24**	**21**	**31**	**42**	**52**	**65**	**14**	**8**	**17**	**36**	**32**	**22**
Crustacea	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
a-Cladocera												
Alona	3	4	5	6	9	1	1	3	6	6	7	3
Daphnia	6	3	21	26	32	6	0	0	0	6	12	11
Oxyurella	4	4	8	8	10	12	3	2	4	6	6	3
Moina	6	8	10	20	22	15	4	2	1	3	5	2
Total	**19**	**19**	**44**	**60**	**73**	**34**	**8**	**7**	**11**	**21**	**30**	**19**
b- Copepoda												
Cyclops	6	6	7	20	26	18	20	4	3	10	15	20
Mesocyclops	0	0	0	10	5	4	0	0	3	15	13	0
Ergasilus	6	4	4	5	3	2	0	0	2	5	7	6
Allodiaptomos	7	8	9	10	7	4	4	6	7	6	6	4
Total	**19**	**18**	**20**	**45**	**41**	**28**	**24**	**10**	**15**	**36**	**41**	**30**
Grand Total	**75**	**79**	**128**	**191**	**216**	**195**	**68**	**43**	**61**	**112**	**129**	**81**

Table-45

Monthly Variation in No. of Zooplankton , Year 2006

Station No-P_3

Protozoa	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Euglena	4	6	10	12	15	18	0	0	2	4	8	6
Arcella	4	3	6	7	8	11	3	1	4	3	4	2
Verticella	3	4	6	6	8	11	0	0	0	0	2	3
Paramecium	3	4	5	9	10	12	1	2	2	5	5	4
Acanphocystis	3	7	8	10	14	15	17	16	6	4	7	5
Total	**17**	**24**	**35**	**44**	**55**	**67**	**21**	**19**	**14**	**16**	**26**	**20**
Rotifera	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Brachionus	12	6	10	15	20	21	2	1	6	7	14	14
Keratella	3	5	7	11	14	15	3	4	6	8	7	5
Philodina	5	6	7	12	15	16	2	3	4	7	5	3
Asplanchna	3	9	15	21	24	24	2	7	10	12	16	7
Total	**23**	**26**	**39**	**59**	**73**	**76**	**9**	**15**	**26**	**34**	**42**	**29**
Crustacea	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
a-Cladocera												
Alona	4	3	4	6	7	4	2	1	4	4	7	2
Daphnia	8	19	21	28	42	4	0	0	0	9	8	10
Oxyurella	3	4	8	10	12	10	3	2	5	4	6	4
Moina	3	1	4	4	6	7	3	2	1	4	5	3
Total	**18**	**27**	**37**	**48**	**67**	**25**	**8**	**5**	**10**	**21**	**26**	**19**
b- Copepoda												
Cyclops	5	6	7	22	28	15	18	6	4	15	20	25
Mesocyclops	0	0	0	8	5	4	0	0	5	14	14	2
Ergasilus	5	3	4	5	3	3	0	0	4	6	8	6
Allodiaptomos	6	8	8	9	10	9	3	2	7	8	5	4
Total	**16**	**17**	**19**	**44**	**46**	**31**	**21**	**8**	**20**	**43**	**47**	**37**
Grand Total	**74**	**94**	**130**	**195**	**241**	**199**	**59**	**47**	**70**	**114**	**141**	**105**

Table-46

Monthly Variation in No. of Zooplankton , Year 2006

Station No-P_4

Protozoa	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Euglena	4	6	11	12	17	18	0	0	4	4	5	4
Arcella	3	4	6	7	9	11	2	1	3	5	7	4
Verticella	3	4	4	5	6	9	0	0	4	2	0	0
Paramecium	2	4	6	9	10	11	2	1	2	5	7	5
Acanphocystis	2	4	6	8	10	15	12	14	16	8	8	1
Total	**14**	**22**	**33**	**41**	**52**	**64**	**16**	**16**	**29**	**24**	**27**	**14**
Rotifera	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Brachionus	14	6	10	18	18	20	4	2	3	7	12	14
Keratella	0	0	0	0	0	5	4	5	3	12	2	0
Philodina	3	6	7	12	17	18	4	3	6	7	8	4
Asplanchna	4	6	15	20	22	25	3	3	10	15	14	7
Total	**21**	**18**	**32**	**50**	**57**	**68**	**15**	**13**	**22**	**41**	**36**	**25**
Crustacea	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
a-Cladocera												
Alona	2	3	4	8	7	3	2	1	3	4	7	3
Daphnia	6	20	22	28	35	8	0	0	0	10	9	10
Oxyurella	3	4	7	8	10	14	3	1	6	7	7	3
Moina	6	8	10	15	20	12	5	3	1	2	5	3
Total	**17**	**35**	**43**	**59**	**72**	**37**	**10**	**5**	**10**	**23**	**28**	**19**
b- Copepoda												
Cyclops	4	5	8	18	22	15	21	4	6	12	18	30
Mesocyclops	0	0	0	9	7	4	0	0	5	14	15	0
Ergasilus	3	4	5	4	3	2	0	0	4	7	9	5
Allodiaptomos	4	9	9	11	12	10	3	2	6	7	4	3
Total	**11**	**18**	**22**	**42**	**44**	**31**	**24**	**6**	**21**	**40**	**46**	**38**
Grand Total	**63**	**93**	**130**	**192**	**225**	**200**	**65**	**40**	**82**	**128**	**137**	**96**

Table-47

Monthly Variation in No. of Zooplankton , Year 2006

Station No-P_5

Protozoa	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Euglena	3	5	8	12	12	15	0	0	2	5	6	3
Arcella	2	3	4	6	9	12	1	1	4	6	7	4
Verticella	3	4	6	7	10	10	0	0	0	0	0	0
Paramecium	4	5	7	8	10	11	2	1	4	6	5	3
Acanphocystis	2	3	4	8	12	15	16	10	12	5	8	7
Total	**14**	**20**	**29**	**41**	**53**	**63**	**19**	**12**	**22**	**22**	**26**	**17**
Rotifera	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Brachionus	12	4	10	15	18	20	21	2	4	8	11	6
Keratella	0	0	0	0	0	6	4	4	2	12	2	0
Philodina	2	4	6	10	15	15	4	3	6	6	7	3
Asplanchna	4	6	12	16	20	23	24	2	3	7	10	6
Total	**18**	**14**	**28**	**41**	**53**	**64**	**53**	**11**	**15**	**33**	**30**	**15**
Crustacea	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
a-Cladocera												
Alona	2	4	8	7	7	3	2	1	4	5	7	3
Daphnia	7	15	20	25	29	6	0	0	0	6	7	10
Oxyurella	2	5	8	10	12	13	2	1	5	7	8	3
Moina	5	8	12	21	18	12	3	2	1	2	4	2
Total	**16**	**32**	**48**	**63**	**66**	**34**	**7**	**4**	**10**	**20**	**26**	**18**
b- Copepoda												
Cyclops	4	5	8	20	25	18	18	4	5	12	20	25
Mesocyclops	0	0	0	8	4	3	0	0	5	13	12	0
Ergasilus	3	2	5	6	8	6	2	1	3	5	5	3
Allodiaptomos	3	5	8	10	11	11	1	1	4	5	6	4
Total	**10**	**12**	**21**	**44**	**48**	**38**	**21**	**6**	**17**	**35**	**43**	**32**
Grand Total	**58**	**78**	**126**	**189**	**220**	**199**	**100**	**33**	**64**	**110**	**125**	**82**

Biological Factors

In the study period (January, 2005 to December, 2006) these MPN, Plankon, aquatic weeds and fishes were investigated.

Plankton

(A) Phytoplankton

In the study period the phytoplankton were observed, quantitatively. qualitatively and identified up to genus which follows.

i- **Chlorophyceae** - It consists 10 genera in qualitative study were observed

(1) Chlorella	(2) Ankistrodesmus	(3) Spirogyra
(4) Ulothrix	(5) Zygnema	(6) Microspora
(7) Scenedesmas	(8) Eudorina	(9) Pandorina
(10) Pendiastrum.		

In quantitative group chlorophyceae varied from 10 org/l to 151 org/l during the period of 2005 and 2006 varied from 13 org/l to 148 org/l.

ii- **Bacillariophyceae** - Mainly 9 genera were observed qualititavely.

(1) Navicula	(2) Synedra	(3) Tabellaria
(4) Fragilaria	(5) Cymbella	(6) Nitzshia
(7) Cyclotella	(8) Astorionella	(9) Pinnularia

In quantitative group Bacillariophyceae varied from 7 org/l to 112 org/l during the period of 2005 and in 2006 varied from 6 org/l to 113org/l

iii- **Cynophyceae** - It combrises 6genera were observed

(1) Agmenellum	(2) Rivularia	(3) Anabaena
(4) Oscillatoria	(5) Microcysits	(6) Gompospaeria

In quantitative group Cynophyceae varied from 5 to 85 org/l during the period of 2005 and in 2006 ranged from 6 org/l to 83 org/l. The number of phytoplankton has been presented in tables.

(B) Zooplankton

The number of zooplankton mainly consisted of proteozoans, rotifers and planktonic froms of crustaceans (Jhingran, 1977). In the present investigation only dominat groups of zooplankton were studied qualitatively and quantitatively and identified upto genous and both the investigation are mentioned below:-

(1) Protozoa – Mainly 5 genera i.e.

(1) Euglena (2) Arcella (3) Verticella

(4) Paramecium (5) Acanthocystis

Group protozoa varied from 3 org/l to 70 org/l during the period of 2005 and in 2006 ranged from 12 org/l to 67 org/l.

(ii) Rotifera – Mainly 4 genera i.e.

(1) Brachionus (2) Keratella (3) Philodina

(4) Asplanchna

Group Rotifera ranged from 7 org/l to 70 org/l during the period of 2005 and in 2006 it varied 9 org/l to 76 org/l.

(iii) Crustacea

(a)- **Cladocera**- Mainly 4 genera i.e.

(1) Alona (2) Daphnia (3) Oxyurella

(4) Moina

Sub group Cladocera varied from 3 org/l to 78 org/l during the period of 2005 and in 2006 ranged from 4 org/l to 73 org/l.

(b) **Copepoda**- Mainly 4genera i.e.

(1) Cyclops (2) Mesocyclops (3) Ergasilus

(4) Allodiaptomos

This sub group Copypoda ranged from 6 org/l to 60 org/l during the period of 2005 and in 2006 varied from 6 org/l to 51 org/l. The population of zooplankton has been presented in tables.

Aquatic Weeds

The various forms of the aquatic weeds were observed during both the years of study from different five stations of the river Paisuni. They were identified and specified as per their types :- :-

S.No.	Name of Species of weeds	Types of weeds*
1.	Azolla Spp.	F.F.
2.	Cypress Sp..	
3.	Chara Spp.	S.
4.	Hydrilla Verticillata	S
5.	Heterophylla Spp.	
6.	Ceratophyllum demersum	S
7.	Lemna Paucicostata	S/F.L.
8.	Nitella Sp..	S
9.	Nypheaea stellota	FF
10.	Potamogeton indicus	S/FF
11.	Potamogeton crispus	S
12.	Utricularia Spp.	

13.	Vallisneria spiralis	S
14.	Morselia quadrifolia	FF
15.	Eichhorinia crassipes	FF

* F.F. = free floating weeds, F.L.= floating level weeds, S.= Submerged weeds

Classified List of Fishes in Paisuni River

Species		Local Name
Family-Notopteridae		
1.	Notopterus notopterus	Patra
2.	Notopterus chitala	Moya
Family-Cyprimdae		
Sub. F. Abramidinae		
1.	Oxygaster bacaila	Chelhwa
Sub. F. Rasborinae		
1.	Catla catla	Catla, or Bhakur
2.	Cirrhinus mrigala	Nain or Bajia
3.	Labeo rohita	Rohu
4.	Labeo calbasu	Karaunt
5.	Labeo bata	Bata
6.	Puntius sarana	Putiyah or Khabda
7.	Tor tor	Mahaseer
Family Cobitidae		
8.	Noemacheilus botia	(Hill stream)
Family Siluridae		
9.	Wallago attu	Parhrin or lanchi
Family Bagaridae		

10.	Mystus seenghala	Seenghala or Tengan
11.	Rita rita	Gigra

Family Saccobranchidae

12.	Heteropneustes fossilis	Singhi

Family Clariidae

13.	Clarias batrachus	Mangur

Family Ophiocephalidae

14.	Channa gachua	Bilaua or Girai
15.	Channa marulius	Padamsaur

Family Centropomidae

16.	Chanda nama	Chanda
17.	Chanda ranga	Chanda

Family Mastacembilidae

18.	Mastacembelus armatus	Bam

DISCUSSION

DISCUSSION

Water is a valuable gift of nature which favours life on the earth. But at the some time, it has been adversely affected both qualitatively and quantitatively by all kinds of humans activities on land, in air or in water. Though, the phenomenon of defilement of water as a result of human activities is as old as human civilization, the increasing industrialization, urbanization and developmental activities and consequent pollution have brought a severe water crisis in the modern era. Today most of the rivers of warld are receiving millions of litres of sewage, domestic wastes, industrial wastes and agricultural runoff containing several kinds of harmful substances. These sustances are making water unfit for human consumption and for its various other uses. The degree of pollution is generally assessed by studying physical and chemical characteristics the water body.

Therefore it is very essential at present to study the different aspects by which these rivers has been badly effected and loosing their natural nature.

Having in view these problems the river Paisuni is studied by taking their Physical-chemical & Biological characteristics considering required parameters for every aspect. Besides, the meteorological conditions are also studied they have direct inpact on aquatic life . Data as regards atmospheric temperature, rainfall relative humidity, photo-period are studied and monthly mean is calculated.

Measures are also suggested for the management of theis river, so that its natural nature might be maintained, which will really be fruitful regarding this the river Paisuni was studied for the period of two years (January 2005 to December, 2006).

METEOROLOGICAL CONDITIONS

Atmospheric Temperature

The atmospheric temperature directly effected the water temperature. High atmospheric temperature increased the water temperature and vice-versa minimium atmospheric temperature 8.90°C. was found in the month of January and maximum 41.50°C. was in April in 2005 and in 2006. The maximum atmospheric temperature 41.94°C. was recorded in June and minimum 8.70°C. in the month of January. So the atmospheric temperature is directly related to water temperature and influenced the river water temperature which affects the primary productivity of biota of river. It showed positive relationship with photoperiod whereas relative humidity was notised negative impact.

Rainfall

The rainfall enhances the turbidity of river water due to silting and decomposition of organic matters in rainy season. It was high during monsoon period 392.80mm. in the month of July and minimum in winter season 14mm. in the month of February. Due to high rainfall as turbidity increased which affected adversely on photosynthetic activity in river water, which decreases the concentration of Dissolved oxygen (D.O.) with the result productivity of water becomes low.

Relative Humidity

If ranged from 20.20% to 81.10% during the year 2005 and in 2006 varied between 16.18% to 79.14%. It is negatively related with atmospheric temperature and positively with rainfall. It increased in monsoon period whereas it decreases in summer season in both the years of study period in the due to cloudy weather and rains, which has negative impact on photosynthetic activities and also adversely effect the biology of the aquatic biota.

Photoperiod

Photoperiod was found maximum in summer season and minimum in winter season. In the year of 2005 it was maximum 13.33hrs. in the month of June and minimum 10.13Hrs. in the month of January whereas in 2006 it was maximum 13.32Hrs. and minimum 10.12Hrs. Photosynthesis is directly related to photoperiod, while increase the concentration of oxygen, high photoperiod was due to high intensity of solar radiation.

Physico-chemical and Biological Characteristic

For the assessment of river water physico-chemical and biological parameters are studied which are :-

Physical

Water temperature, water current and Turbidity.

Chemical

Hydrogen-ion-concentration (pH), carbonates (CO_3), Bicarbonates (HCO_3), Total Alkalinity (T.A.), Total Hardness (T.H.), Chloride (Cl), Dissolved oxygen (D.O.), Bio-chemical oxygen Demand (B.O.D.), Chemical oxygen Demand (C.O.D.), Ammonical Nitrogen (NH_4-N), Nitrite (NO_2), Nitrate (NO_3), Phosphate (PO_4), Sulphate (SO_4), Sodium (Na), Potassium (K), Carbon-di-oxide (CO_2) and Fluoride (F).

Biological

Plankton (phyto and zoo), Aquatic weeds, Total coliform (MPN) and Fish Fauna.

Physical Factors

Water Temperature

Temperature is one of the most important factors. It's effect on most of the bio-chemical and physiological reactions, which tape place in the aquatic

organisms. As the river is shallower than Yamuna, therefore the impact of the atmospheric temperature is more. Odeum (1956) reported that if the transparency of the water is reduced by reduction of light availability, it would adversely effect the temperature of water and thus the primary production decreases due to lack of photo synthetic activity.

In the present study of River Paisuni water temperature varied between 17.00°C. to 36.30°C. in the year 2005 and between 17.10°C. to 35.70°C. in the year 2006 at different sampling stations. The mean value of water temperature in study period of 2005 is 26.35 to 27.32 and between 24.59 to 27.23 in the year of 2006 ranged at different sampling stations. The lowest temperature of water was recorded during winter season (Jan. & Dec.) while the highest temperature was noticed in summer season (May & June) in both the years of study. Amongst all sampling station (I to V) the water temperature was found to be comparatively higher at station IV due to low water leavel, sewage pollution. The observation are resemble to the finding of up adhyay et. al. (1982) studied the physico-chemical condition of river Kathmandu valley and found temperature between 15°C and 30°C. Ajmal et. al. (1982), Singh et. al. (1995), Saxena (1970), Nath (2001), Khan (1978). Higher water temperature at polluted stations may be attributed to a lot of chemical activity due to discharge of huge quality of municipal and sewage wastes into the river.

Discharge of sewage from municipal drains in the river stretch resulted depletion of dissolved oxygen, growth of Blue-green algae and put stress on fish and aquatic life. Besides affecting biota, high temperature sharply decreases the solubility of oxygen in water, due to increase in microbial activity, which in turn leads to higher oxygen consumption leading to a consequent decrease dissolved oxygen content of water and cause asphyxiation on fishes and it may be total this results occasional fish mortality (Jhingaran, 1991).

Temperature affects the quality of water for its potability and recreational use. besides, this it also affects the permeability of cytoplasm, metabolic rates and reproductive ability of the aquatic biota. Temperature measurments are useful in indicating the levels of chemical, biological and bio-chemical activities along with saturation values of solids and gases present in water.

In the present study, the river water temperature showed significant possitive correlation with total alkalinity and negative correlation with Dissolved oxygen.

Temperature is one of the determining factors in the seasonal concentrations of planktonic organisms (Allen, 1920). Regarding the role of temperature in regulating the seasonal abundance of different groups of zooplankton, varying statement have been put forward, Byars (1960) reported that the temperature had the greatest influence on th productivity of Rotifers. Ganapati (1954) have mentioned that the seasonal variations in the density of copepods were influenced by temperature. The Rotifers showed preference for lower temperature and were abundent in November through they were also in good numbers in the month of June due to considerable quantity of diatoms and Blue-green algae. The copepods also showed similar pattern. They were abindant in september and November during present investigations. This work is confirmity with Saha (1985) and Singhal et. al. (1996).

Turbidity

The term 'turbid' is applied to waters containing suspended matter that interfere the passage of light through it. This may be due to the suspension of clay, silt, finely divided in organic matter and similar microscopic substances. In the river, under flooded conditions, it may be due to the relatively coarse dispersal of organic materials serving as food for the flora and fauna which in turn produce an additional load on the other side, this may have a sanitary significance because of the aesthetic nature, filterability and disinification.

The turbidity may be temporary (caused by rains and floods etc.) or perennial (based on the nature of basin, water currents and wind actions). Besides it may indicate the high fertility beyond a limit which further becomes harmful to flora and fauna.

This high turbidity adversely effects the productivity of biota due to interference in light penetration, which plays a great role in photosynthetic activity. Jhingaran (1991) reported that the fish fertility in very highly turbid water is badly effected along with its flora and fauna.

Turbid water is unfit for domestic parposes and also for industrial uses and interferes with the self purification of streams and river by reducing the photosynthetic activity of water plants and by smoothing benthic organisms. Turbidity had been measured in J.T.U. (Jackson Turbidity Unit) but recently N.T.U. (Nephlometeric Turbidity Unit) is used and estimated by Nephlometer. 5 N.T.U. is the optimum which is recommended by W.H.O. for drinking water whereas Indian standared permit upto 10 N.T.U. in the absence of any alternative source.

In the present study the turbidity of river water ranged from 1.90 to 8.00 N.T.U. in the first year in 2005 and 2.00 to 8.10 N.T.U. in the second year 2006. The highest value of turbidity 8.10 N.T.U. was recorded at station V in August 2006. The higher value was in summer due to sand by high wind velocity whereas in monsoon contamination of organic matter through surface run-off basin sand. The mean value of turbidity during the study period ranged from 3.81 N.T.U. to 5.99 N.T.U. during both the years of study.

Different suspended particles reduce Dissolved oxygen in water due to ill effects of photosynthetic activity. Jhingaran (1991) reported that the suspended particles absorb considerable amount of nutrient elements like phosphotes, potassium and Nitrogen in the ionic form making them unavailable for plankton production.

Upadhyay (1997) studied Kaliasote dam and found the turbidity in range between 2.0 and 16.20 N.T.U. Saxena (1998) found the turbidity in range of 17.0 to 90.0 N.T.U. in surface samples of shahpura lake. High turbidity in river water was also reported by Agrawal (1993). Shukla (1996), Mitra (1997). It was also noted that the turbidity values were greater during rainy season at all the stations so, these work are in confirmity with the present work.

Water Current

It is one of the important factors which has a direct relationship with the turbidity. Water current is generally dependent upon the amount of water available and also on its depth. In present study the current of the river ranged 20.80cum./ sec. to 1160.50cum/sec. during the years (2005-2006) of study of this shallow river.

The maximum value of water current 1160.50Cum/Sec. was recorded at station No. III. Which is shallowers the variation are due to flood in spon of the river. In Paisuni river, the water current was found to be highest during rainy season at all the stations and the slow water current in summer enhances the organic materials. This expresses that the reduction in the water swiftness promotes the better niche for the plankton community.

The main features of the influx is significance of the river is the silt laden water flow which was recorded maximum during the mansoon period because of the high flood. During the summer the river almost change into a slow spilt channel like a trickling stream, due to the less rainfall conditions water current showed positive correlation with turbidity, mostly stations. Obviously water current is plays agreat role in fertility as well as production of fishes.

Chemical Factors

Hydrogen-ion-concentration

The Hydrogen-ion concentration of natural water is an important chemical factor. The pH of water measures the intensity of acidity or alkalinity by the concentration of H^+ & OH^- ions in water. It also gives an idea of the type and intensity of water pollution. pH in natural water depend upon the amount of carbonates bicarbonates and carbon-di-oxide tension. The later is effected by photosynthesis of aquatic vegetation and respiration of animals. In the present study pH of river water ranged from 7.20 to 8.96 in two year of the study period. Higher pH value in summer was due to the utilization of free carbon-di-oxide during active photosynthesis and minimum value was recorded during winter season due to dissociation of carbonic acid (H_2CO_3). At station- I, II, III and IV pH value showes minor variation whereas station-V had major fluctuation in comperision to other stations which was due to more organic materials and drainage through. Nala from Kolvaliya town. Besides it is a confluence point where this Paisuni river joins the river Yamuna at this station. The water is more alkaline there As the impact of pH values causes water either acidic or alkaline there As the impact of pH values causes water either acidic or alkaline. So, the medium of water plays a great role in fertility. Swingle (1967) observed that water having a pH of 6.5 to 9.0 are most suitable for fish culture and those having pH values of more than 9.5 is unsitable because in the later carbonate is not available whereas fish die at about pH 11. Devid (1966) and Tiwari (1983) reported that pH has positive correlation with total alkalinity.

Carbonates (CO_3)

Carbonates play in important role in maintains of pH water and this regulates alkalinity acidity of the water. In the process of photosynthesis CO_2 is removed, this increasing the carbonates Wiebe (1930) reported the pH is controlled by the

photosynthesis and it would follow that pH and carbonates would vary directly. An apparent co-relation has been reported between pH and CO_3 in the water.

In the present study water showed alkaline nature through out the study period. The carbonate of water ranged from 14.00ppm to 27.00ppm. in the year 2005 and between 13.00ppm. to 28.00ppm. in 2006 at different sampling stations. The mean value of carbonate in the study period of 2005 varied from 20.08 to 21.66ppm. and in 2006 ranged from 19.41 to 22.16ppm. at different sampling stations. The low value of carbonates was noted in mansoon period. Which might be much water volume which changes in the level of hydrogen-ion concentration. Highest values of CO_3 were recorded in summer season due to low water volume higher photosynthetic activity due to more photo period such trend have been observed by Gupta (1989). So, the present investigation is in confirmity with the above reported work.

Bicarbonate (HCO_3)

The bicarbonate content was invariably in appreciable quantity in water bodies and a wide range of fluctuation was noticed indicating hard and alkaline nature of water bodies in the investigation the river water bicarbonate varied between 142.00ppm. to 173.00ppm. in the year of 2005 and in 2006 in ranged between 140.00ppm. to 176.00ppm. at different sampling stations. The mean value of bicarbonates during the study period of 2005 varied from 154.16 to 155.58ppm. and in 2006 ranged from 151.58 to 156.00ppm. at different sampling stations. The contents of bicarbonate were high in summer season due to addition of animal excreta and free CO_2 . It's concentration decreased during winter and mansoom period due to dilution of water.

Rao et. al. (1981) reported HCO_3 range of 100 to 226ppm. from the reservoir higher HCO_3 alkalinity values are recorded in the month of June and lower values in

the month of December. The present findings are to some extent resumble with the above work.

Total Alkalinity

It is characterisized by the presence of hydroxyl ions capable of combining with hydrogen ions. Highly alkaline water is usually unpotable. The resultants may be due to carbonates, bicarbonates and hydroxide contents added with the contribution from, phosphates and sulphate. This may have the natural concentrations suitable for irrigation and others. Water supplies with less than 100mg/l are desirable for domestic use. The alkalinity value is also important in calculating the dose of alum and biocides in water. Alkalinity producing substances such as sodium bicarbonate are added to check corrosion in soft water supplies.

The alkalinity of water has little Public health significance, it is not harmful to human beings but alkalinity beyond 200mg/litre causes unpleasant taste to the water BIS has set a desirable level of alkalinity in drinking water to be 200mg/l whereas its permissible value has been prescribed to be 600 mg/l in the absence of alternative source.

During the present study the value of total alkalinity varied from 167.00ppm to 190.00ppm in the year 2005 and in the next year 2006 it varied from 162.00ppm to 193.00ppm. The maximum value of Alkalinity was found at station I in month may in the year 2006. Due to pollution.

The present findings are in confirmity with the observations made by the researchers, Raina et. al. (1984), Mishra et. al. (1990), Ramana et. al. (1994), Mitra (1997) and Sharma (1999).

Total Hardness (T.H.)

It is for the assessment of the quality of water supplies. In general, the hardness of water is mainly due to the presence of calcium and magnesium salts. The hardness in water is derived largely from contact with the soil and rocks. In general hard waters are found in areas were the top soil is thick and limestone formations are present whereas soft water are seen in areas where the top soil is thin and limestones formation are absent.

In the present study the value of hardness in the river water varied from. 150.00ppm to 282.00ppm in the year 2005. The mean value of hardness ranged from 186.66 to 209.16ppm. The minimum value of hardness observed in the month of August during both the years due to more dilution of water, less evaporation, exchange of sodium ions and concentration of calcium is reduced at higher pH due to its precipitations as calcium carbonate. The maximum value of hardness was found at station-II in May in both the years due to bath of people

The significant variations were found in summer and post monsoon period. This type of variation is due to the more rocks formations and anthropogenic activities of the holy fairs arranged there. The hardness has been understood to be a measure of the capacity of the water for soop precipitation. It is caused by bivalent metallic cations.

The W.H.O. has set its desirable limit to be 100ppm. According to limit of W.H.O. the water is soft and above this range it was hard. Ajaml et. al. (1982) found higher value of hardness recorded during summer in the study of river Ganga. The present findings resemble with this work.

Chloride (Cl)

The chloride is very important factor of water, their concentration change

when physico-chemical and biological process take place in water. It is present in appreciable amount in almost all natural waters. The chloride content normally increases as the mineral content increases. The most important sources of chloride in the water is disposal of domestic sewage. Its limit for water to be used as drinking purpose has been set to be 250ppm. by BIS. Its above range of chloride water becomes salty taste and effect the palatability of water.

Human and animal excreata have high quantity of chlorides along with nitrogenous compounds. Since chloride is set to be accompatied with faeces. Hence increase in chloride concentration serves as one of the signals of faecal pollution.

In the investigation chloride concentration was in the range of 16.00ppm to 35.32ppm. in the year of 2005 and in 2006 it range between 15.00 ppm to 35.30ppm at different stations. The mean value of chloride during the study period of 2005 varied from 22.99 to 25.54ppm. and in 2006 ranged from 22.76 to 25.39ppm at different monitoring station-. The highest concentration was observed at station-V during both the years, due to addition of domestic waste sewage and municipal wastes into the river. Higher value of chloride also recorded at station-I due to washing, bathing and other extraneous sources and joins nala.

During the occassion sudden increase in value of chloride was recorded at station-I, II, III and V in the month of November, January, March due to pilgrims activities on. Deepavali mala, Amavasya, Makar Shankranti, and Kartik Poornima fair and animal excreata increases the faecal pollution in the river water.

The present study of chloride showed correlation with water temperature, ammonical nitrogen. It is also directly related with phytoplankton and zooplankton population.

Ajaml et. al. (1982) noticed a wide range of chloride contents in Ganga river due to in pouring of industrial and sewage effluents. Thus the pollution resources increase chloride concentration obviously the present work resembles with the above work.

Dissolved oxygen (D.O.)

The dissolved oxygen is very important parameter in water quality assessment. Its optimum presence is essential to maintain various forms of aquatic life. The effects of waste discharge in water bodies are largely determined by the oxgen balance of the system. Non-polluted surface waters remain normally saturated with dissolved oxygen, however, it can be rapidly removed from the waters by discharge of the oxygen demanding wastes. In organic agents such as hydrogen sulphides, ammonia, nitrites, ferrous, iron and certain oxidizable substances also tend to decrease dissolved oxygen in water.

Most of the critical conditions related to dissolved oxygen deficiency occur during the summer season. This directly influence the biomagnification and bioaccumulation of the river ecology.

In the present investigation the river water showed good values of Dissolved oxygen varying from 5.90ppm to 9.09ppm. in the year 2005 and between 5.03ppm to 9.07ppm in 2006 at different sampling stations. The mean value of Dissolved oxygen during the study period was 7.08 to 7.26ppm. The highest value of D.O. was observed during winter season due to low temperature and much water quantity whereas lowest value recorded in summer season due to high temperature and low water level which decreases the oxygen holding capacity of water.

The dominance of zooplankton over phytoplankton is responsible for depletion of oxygen, the respiratory demand of the relatively more dominant

zooplankton besides the presence of pollutants discharge by the various drains, are the contributory limiting factors for the low or nil dissolved oxygen values. The concentration of D.O. is also effected by the contamination of animal excreta. Its measurement provides a valuable clue to the metabolic balance of a water body.

The water quality criteria according to C.B.P.C.W.P. (1985) suggest minimum level of Dissolved oxygen upto 5ppm. is suitable for drinking purpose. Studying seasonal variation in dissolved oxygen, have recorded lowest value of this parameter during summer in Ganga river at Kanpur while highest value of dissolved oxygen in this river at various places was found upto 9.90ppm. (Ajmal et. al. (1982) Prakash et. al. (1978) observed dissolved oxygen upto 8.8ppm. in Jamuna river at Agra. The minimum value of dissolved oxygen in Yamuna was noted in summer due to high temperature and maximum value of dissolved oxygen in winter were due to low temperature (Sharma, 1985) present investigation resembles with the above work.

The trend of Dissolved oxygen value showed variation on seasonal and interstational basis D.O. values mostly similar at station-I. II, III and IV whereas at station V the value of D.O. found much rather than other station due to much quantity of water, deepness and confluence of the river.

Biochemical oxygen Demand (B.O.D.)

Biochemical oxygen Demand (B.O.D.) is the amount of oxygen utilized by micro-organisms in stabilizing the organic matter. It represents quantity of dissolved oxygen in mg/l required during oxidation of decomposable organic matter by aerobic biochemical action on an average basis, the demand for oxygen is proportional to the amount of organic waste to be decomposed aerobically decomposed may be interpreted as organic matter can serve as food for the bacteria and energy derived from its oxidation. It is a good index of organic pollution and help in deciding suitability of water for consumption.

In the study period the value of the B.O.D. in the river water varied from 0.90ppm. to 2.29ppm. in the year 2005 and between 1.00ppm to 2.40ppm. in 2006 at different stations. The means value of B.O.D. during the study period was 1.58 to 1.74ppm. The maximum value of B.O.D. was noticed in month of June 2005 due to city sewage, waste pollution and high temperature where minimum value of B.O.D. was observed in September because of more dilution of water and self reoxygenation process during the course of its flow upto last station and also due to low temperature. B.O.D. showed significant positive correlation with temperature in most of the time. The present work resemble to the Rajkumari (1999) studied the B.O.D. in the range of 1.1 to 14.0ppm.

Chemical oxygen Demand (C.O.D.)

The chemical oxygen demand (COD) is the amount of oxygen requered by the organic matter in the waste water to oxidise them by strong chemical oxidant. The C.O.D. test is helpful in indicating toxic condition and the presence of biologically resistant organic substances.

In the present investigations C.O.D. value varied from 12.50 to 15.99ppm. in the year 2005 and the maximum value in the year 2006 16.78ppm. The mean value of C.O.D. during the study period of 2005 varied from 14.10 to 14.16ppm. and in 2006 it ranged from 13.25 to 14.86ppm. at different sampling stations. The desirable limit of C.O.D. is 10ppm. in drinking water as recommended by W.H.O. During the investigation the highest value was observed in summer season due to high temperature, low water level and much organic concentration whereas lowest value was in rainy season due to dilution of water, low temperature and less density of organic matters.

The C.O.D. showed positive correlation with B.O.D. temperature and the load of organic matters at most of the stations B.O.D. and C.O.D. are the indicator

of water quality. Verma and Ajmal et. al. (1985) have found maximum C.O.D. values in river Kali during summer. Its, this is in confirmity with the present study.

Ammonical Nitrogen (NH_4-N)

Organic nitrogenous matter is destroyed by microbiological activity with the production of ammonia. The most important source of ammonia is the ammonification of organic matter. High concentration occurs in water, polluted by sewage or some kinds of wastes containing either organic nitrogen or directly ammonia or ammonium salts sewage has large quantities of nitrogenous matters. thus its disposal tends to increase the ammonia content of the water. Occurrence of ammonia in the water can be accepted as the chemical evidence of organic pollution. If only ammonia is present, pollution by sewage must be very recent. The occurence of nitrite with ammonia indicates that some time has been lapsed since the pollution has occured. If all the nitrogen is present in nitrate form, along time has been passed after pollution because water has purified itself and all nitrogenous matter has been oxidised.

Ammonia in higher concentration is harmful to fish and other biota. It is also toxic to man at higher concentrations. The limit for free ammonia for fish culture is 0.15ppm.

In the present study ammonical nitrogen concentration varied between 0.04 to 0.06ppm. in the year 2005 while in the year 2006 the range of ammonical nitrogen varied between 0.03 to 0.07ppm. at different sampling stations. The mean value of ammonical nitrogen during the study period of 2005 varied from 0.04 to 0.07ppm and in 2006 varied from 0.04 to 0.05ppm.

The minimum concentration was found in the month of August where as maximum concentration was noticed in the month of April. The increase trend was

noticed in summer and post monsoon period due to much decomposition of organic matter, animal excreta, high alkalinity and high temperature Hutchinson (1957) also investigated that summer maxima of ammonia concentration was observed, it is in confirmity with the present work. It showed positive correlation with temperature and total alkalinity at most of the stations. The value of ammonical nitrogen varied from station to station. The Highest value was found at station II due to decomposition of organic matter and at station-V due to much waste and animal excreta.

Nitrite (NO_2-N)

The nitrites represent an intermediate form during denitrification and nitrification reactions in nitrogen cycle. The nitrates are very unsuitable ions which get converted into either ammonia or nitrate depending upon the conditions prevailing in the water. Presence of even a small quantity of nitrite will indicate the organic pollution and the availability of partially oxidized nitrogenous matter. Nitrite may also be produced in distribution system through the activities of micro-organisms on ammonia

During the present study the concentration of nitrite was found in the year 2005 from 0.06ppm. to 0.09ppm. and in the next year 2006 it ranged between 0.06ppm. to 0.09ppm.

The maximum concentration of nitrite was recorded at station V. Nitrite showed a positive correlationship with, chloride and sulphate at most of the stations Upadhyay (1997) found the concentration of nitrite in range of Nil to 0.469ppm. in Kalia sote dam. Joy et. al. (1990) also reported the physico-chemical characteristics of periyer river and found that the value of nitrite was between nil and 0.48ppm. So, it is ressembles with the present work.

Nitrate (NO_3-N)

Nitrate usually occure in trace quantites in surface water. It is an important plant nutrient and most oxidized form of nitrogen. The most important source of the nitrate is biological oxidations of organic nitrogenous substances which come through sewage and domestic wastes. Domestic sewage contains very high amount of nitrogenous compounds. Run-off from agricultural fields is also high in nitrate.

High concentration of nitrates are useful in irrigation but their entry into water resources increase the growth of nusance algae and triggers eutrophication. Information of change in the concentration of nitrates and the concentration of other nitrogen forms may be used to characterize the rate of process of self purification and the self purifying capacity of the river BIS has set a desirable limit of nitrate contents in drinking water as 45.0ppm. and a permissible limit of 100ppm. in the absence of any other alternate source.

In the present study course of river Paisuni the nitrate level was observed in the range of 0.10ppm. to 0.59ppm. in 2005 whereas in 2006 ranged between 0.10ppm. to 0.58ppm. Highest value was found at station-V due to decomposition of organic matter.

The nitrate showed significant positive corelation with a sulphate . Present findings are in conformity with the findings of Sharma (1998) found nitrate in the range varied from nil to 3.33mg/l in sewage waters of Gwalior region.

Phasphate (PO_4)

Phosphate in an important and major source for plant growth and also responsible for biological productivity. It's importance in environmenal studies for because of their significance as a vital factor in life process. In unpolluted bodies of water phosphates are formed mainly during certain biological process of

transformation of organic substances to in organic phosphates. During the vegetation period the phosphates of soluble form are readily taken up by aquatic plant organisms mainly phytoplanktons considerable irregular increase in the concentration of phosphate indicates the presence of pollutants. Major sources of phosphates are domestic sewage detergents, agricultural effluents with fertilizer and waste water which may enter in the water body in significant amount along with the run-off water from the catchment area.

The prime concern of phosphates lies the ability to increase the growth of nuisance algae and caurses eutrophication. Though BIS or USEPA have not set any standard value for phosphates in drinking water but owing to the above discussed importance this parameter was also monitored.

During the study period the level of phospate content was recorded between 0.13 to 0.42ppm. in the year 2005 and in 2006 varied from 0.15 to 0.42ppm. The maximum concentration was observed at station-IV in July due to agricultural run-off and sewage which cause eutrophication whereas minimum concentration was noticed in the month of December due to lack of discharge.

Most of the workers Upadhyay (1997), Pandey & sharma (1999) reported high phosphate concentration at polluted sewage contaminated stations of the rivers as compared to unpolluted ones, Accumulation of phosphate in winter may be attributed to its formation, accumulation and addition through sewage and agricultural drainage due to it lesser and slower utilization in photosynthetic activity. The present findings are in conformity with the work of Upadhyay (1997) determined the phosphate in the range varied between ND and 0.563ppm. in Kaliasote dam. Phosphate showed positive correlation with sulphate at most of monitoring stations.

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Sulphate (SO_4)

Sulphate is an important constituent of hardness with calcium and magnesium and import permanent hardness to the water. Sulphate content of natural water is an important consideration in determining their suitability for public and industrial supply because of its cathartic effect upon human when it is present in excessive amount but at higher concentration it causes gastrointestinal irritation when sodium or magnesium is present.

It is a naturally occurring ion in all kinds of natural water. It is found in arid and semiarid regions, particularly in higher concentration due to the accumulation of soluble salts in soil. The supply of sulphate ions in surface, ground and under ground water, under natural conditions is due to the reaction of water with sulphate containing rocks. It is also due to the bio-chemical and chemical oxidation of sulphide and other compounds of sulphur. Sulphate determination in polluted water, sewage and industrial effluents are of paramount-importance because sulphate is directly associated with odour and corrosion problem.

Increase in sulphate concentration related to the pollution of the water body. Sulphate undergo transformation to sulphur and hydrogen sulphide under strong reducing conditions specially in the condition when the Dissolved oxygen is completely depleted and used for the organic matter break down by bacteria.

In the present study the concentration of sulphate was found in the range of 11.30 to 32.41ppm. in the year 2005 and between 12.00 to 31.41ppm. in 2006 at different sampling stations. The mean value of sulphate during study period ranged between 18.72 to 23.83ppm. at various sampling stations. The maximum value was observed in summer season June month at station-IV, II and I in 2005 and 2006 due to deposition of wastes and presence of rocks.

The present observations resemble with the work of Singh (1999) who recorded the sulphate value in the range of 0.02 to 10.96 in Narmada river. The sulphate showed positive correlation with phosphate, sodium and potassium at most of the monitoring stations.

Sodium (Na)

Sodium is one of the most abundant elements occurring in nature. In natural waters, the major source of sodium is weathering of various rocks. Sodium is an important element which harm human physiology if present in high concentration. The ratio of sodium to total cations is important in agriculture as well as human pathology. A high percentage of exchangeable sodium in a dispersion restricts water movement and affects plant growth.

Many wastes and domestic sewage are rich in sodium and increase its concentration in natural waters after disposal. At logwer concentrations there are no adverse effects on the health. High concentration of sodium associated with chlorides and sulphate make the water salty and renders it unpotable. The WHO has prescribed a limit of 200ppm. of sodium for potable water.

In the present study, the concentration was found from 30.0 to 48.0ppm. in the year 2005 while in the 2006 the sodium content fluctuded between 30.0 to 45.0ppm. The maximum value was at station-III in the year 2005. The mean value of sodium during the study period in 2005 varied from 33.40 to 34.25ppm. and in 2006 it ranged from 33.83 to 34.75ppm. at different sampling stations. So, this river water it is potable for drinking purpose and fishes.

The present observation resemble with the work of Sharma (1998) studied the sewage water in Gwalior region and registered sodium in the range of 0.08 to 0.75ppm. Sodium showed positive correlation with potassium phosphate and sulphate.

Potassium (K)

Potassium is one of the important cations occurring naturally. It plays avital role in the metabolism of fresh water environment and acts as an enzyme activatar. The quantities increase in the polluted waters due to disposal of waste waters. As such it is not very much significant from the health point of view but large quantities may be laxative. BIS, WHO, USEPA has not set any standard value of potassium for drinking water. A number of studies have been carried out on the presence of potassium in natural water resources.

In the present study, the potassium contents in the Paisuni river water fluctuated between 0.29 to 9.0ppm. in the year 2005 and in year 2006 varied from 0.30 to 9.0ppm. The minimum value was observed in the month of January and the maximum value was observed in the month of August at station-II in the both years due to confluence of domestic wastes and sewage.

Present findings are confirmity with Das et. al. (1992) reported potassium fluctuation between 1.6 and 6.3ppm. in river Brahmaputra. Upadhyay (1997) found the potassium in range of ND to 6.0mg/l in Kalasote Dam. The potassium exhibited significant positive correlation with sodium phosphate etc. at some places.

Carbon-di-oxide (CO_2)

Carbon-di-oxide in natural water is derived from the atmosphere, respiration of animals and plants in night, bacterial decomposition of organic matter, seeping ground water and combination with other substance chiefly calcium and magnesium in water. During day time, carban-di-oxide becomes lesser due to its utilization in photosynthesis while during night time it is greater because it is given off as a result of respiration by aquatic plants. It is highly soluble in water. The absence of free carbon-di-oxide is explained on the basis that either it is completely utilised by the phytoplankton or it is converted into carbonic acid finally into stable carbonates.

The high CO_2 contents appear to be more toxic in the presence of low oxygen contents (Welch, 1952). Hutchinson (1957 explained that the study of carbon-di-oxide is quite important to understand the hydrogen ion concentration of water.

In the present study carbon-di-oxide concentration ranged from 12.10 to 18.70ppm. in the year 2005 while in year 2006 varied from 11.00 to 18.80ppm. at different sampling stations. The maximum value at the station-III was found in the study period due to bathing and high temperature and respiration of living organisms. The concentration of carbon-di-oxide showed an inverse relationship with dissolved oxygen and pH value, while significant positive correlation with water temperature in the present observation.

Fluoride (F)

Fluoride is one of the most important elements of the water quality. It is caused by industrial effluents manufacturing plants and phosphote fertilizer units etc. Fluoride adverse effects on the physological activeties of fishes as well as human beings.

In the present investigation range of variation in the fluoride was observed from 0.12 to 0.83ppm. in the year 2005 while in the year 2006 it was found 0.13ppm. to 0.82ppm. The minimum value was found in January and the maximum was in october in both the years. The mean value fluctuated between 0.40 to 0.45ppm. in the study period.

Fluoride in drinking water disallows dental caried in children and to a lesser degree in young adults where the addition of fluoride to the water supply has been practiced, a 1.0ppm. concentration has been recommended, with a permissible operating range of 0.8-1.2ppm. It is believed that mottling of the teeth or enamel fluorosis takes place concentrations above 1.2ppm. when fluoride has been nataraly

present, the concentration must not average more than 1.2ppm. Presence of fluoride in concentrations more than 1.5ppm. should be hurmful. In the orctic and suborctic areas fluoride must be maintained at 1.4ppm.

On the bases of permissible limits given as above the fluoride concentration on the river Paisuni water is lesser oboviously this river water has no ill effect reather it is suitable for drinking as well as aquatic biota purpose on fluoride concentration bases. This is because there is no industry effulents etc.

Fluoride showed positive correlation with water temperature, total Hardness, Sodium, Potassium and negative correlation with carbonate and dissolve oxygen chinoy N.I. (1991) studied effect of fluoride on physiology of animals and human beings.

Atmosperic temperature (°C)

Year- 2005

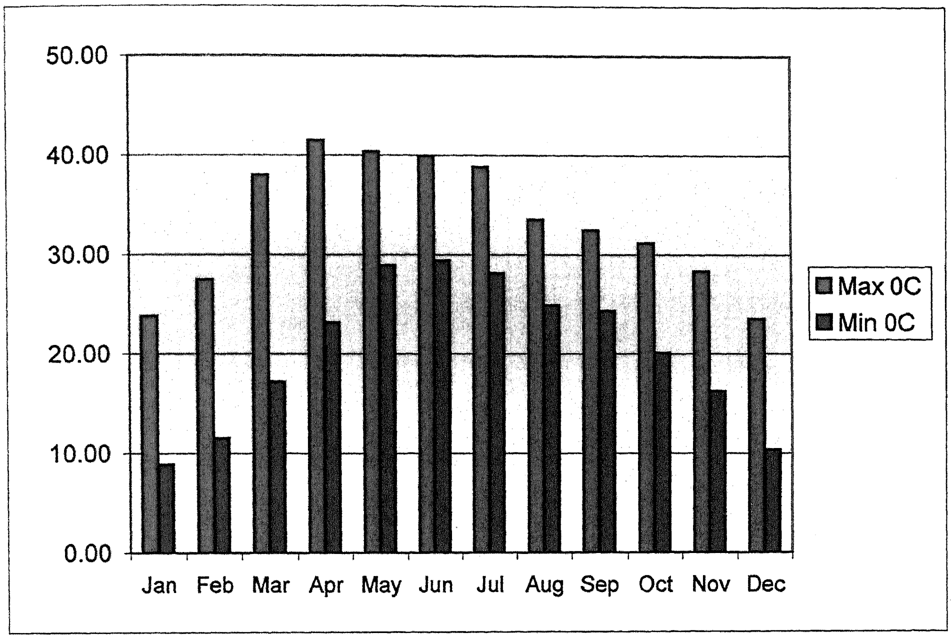


Fig-2

Year 2006

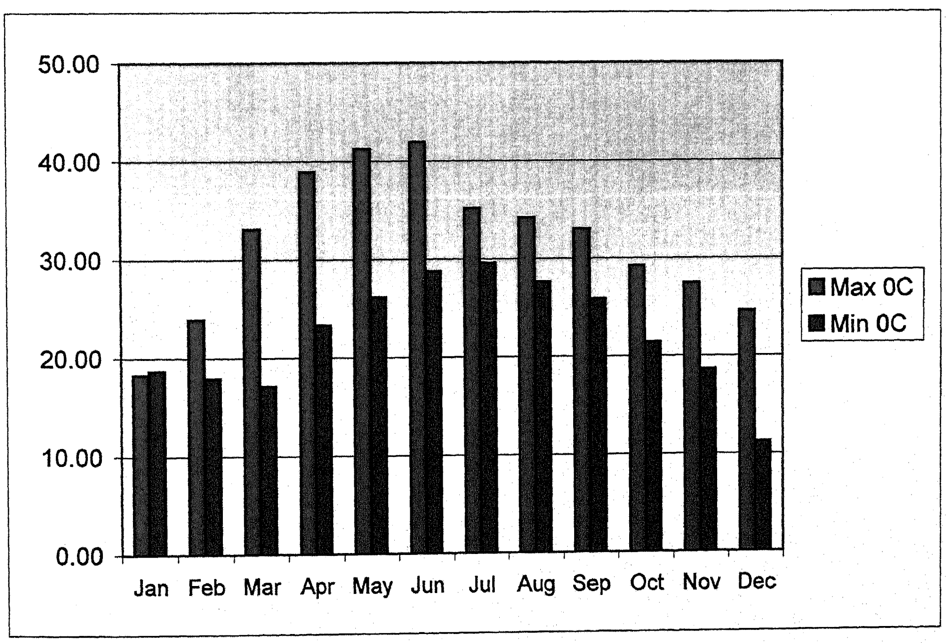


Fig-3

Water Temperature (oC) Turibidity (N.T.U.) & Hydrogen-ion Concentration

Station P1

Period- 2005

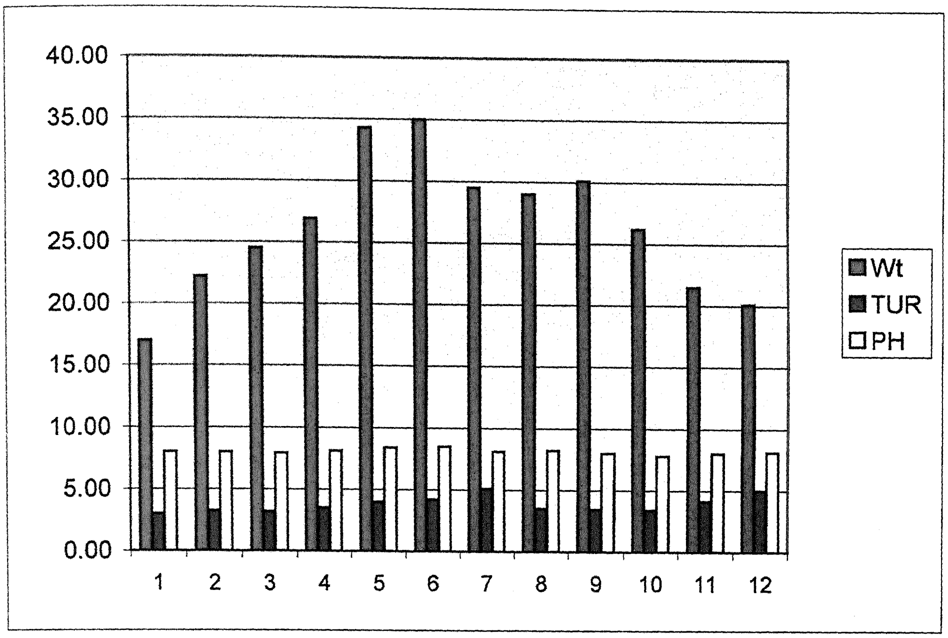


Fig-4

Station P1

Period- 2006

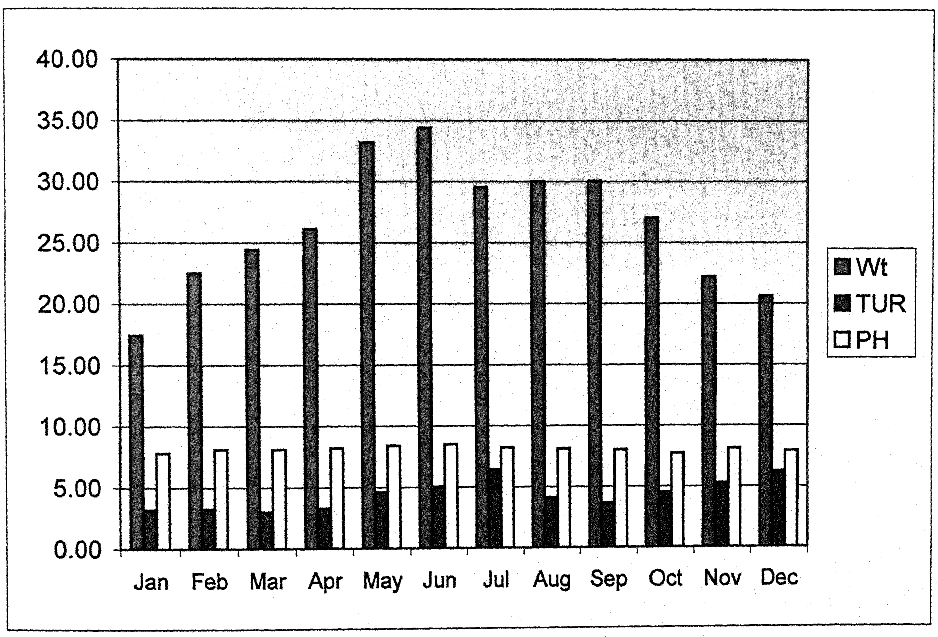


Fig-5

Carbonate (ppm.) Bicarbonate (ppm.) Total Alkalinity (ppm)

Station P1

Period- 2005

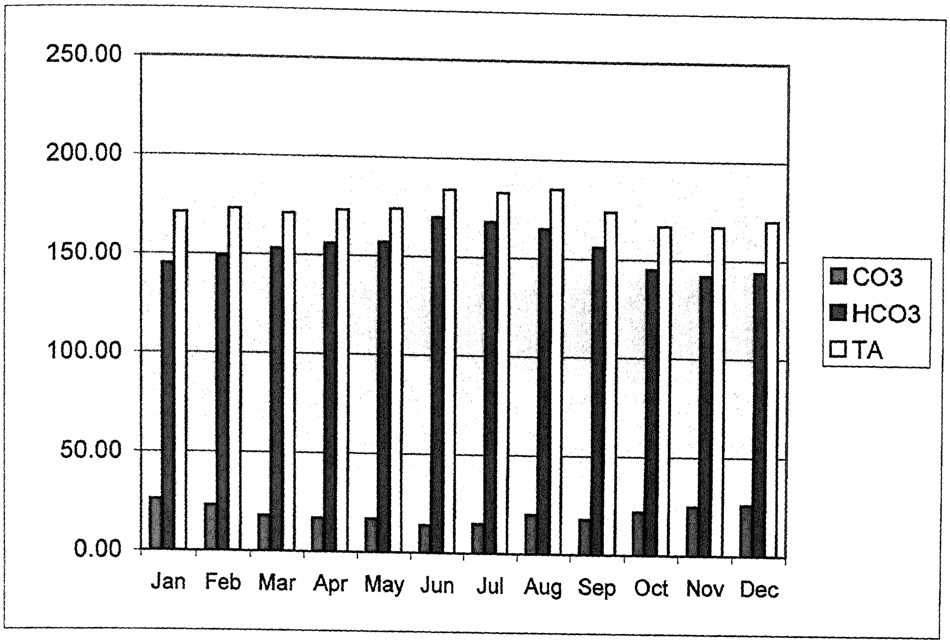


Fig-6

Station P1

Period- 2006

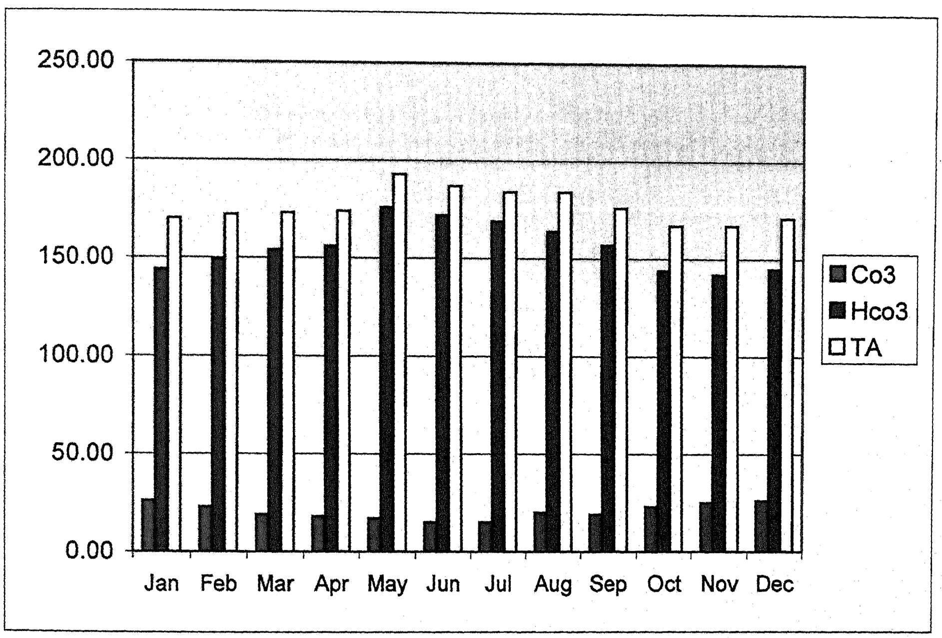


Fig-7

Total Hardness (ppm), Chloride (ppm) Dissolved- Oxygen (ppm)

Station P1

Period- 2005

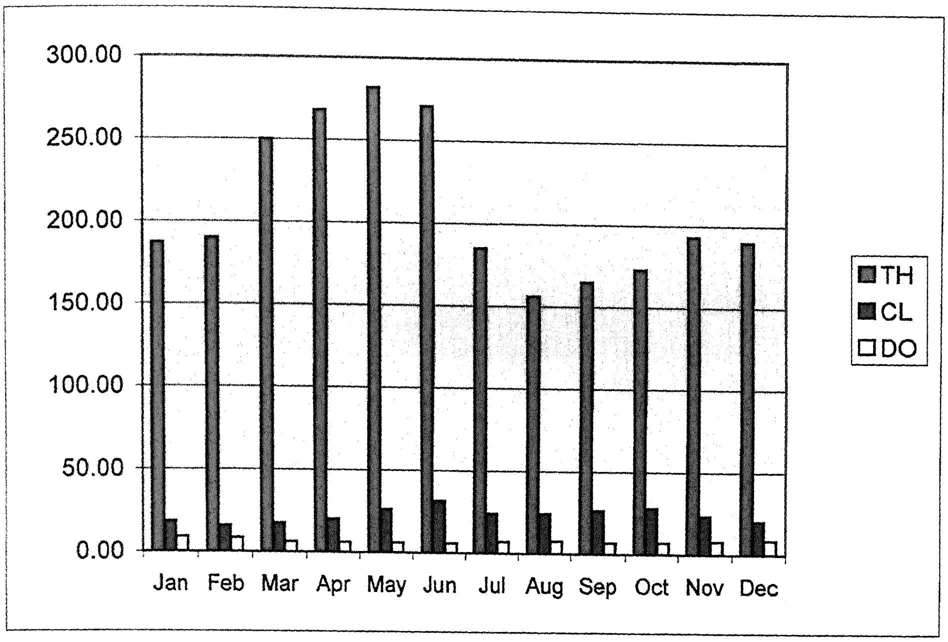


Fig-8

Station P1

Period- 2006

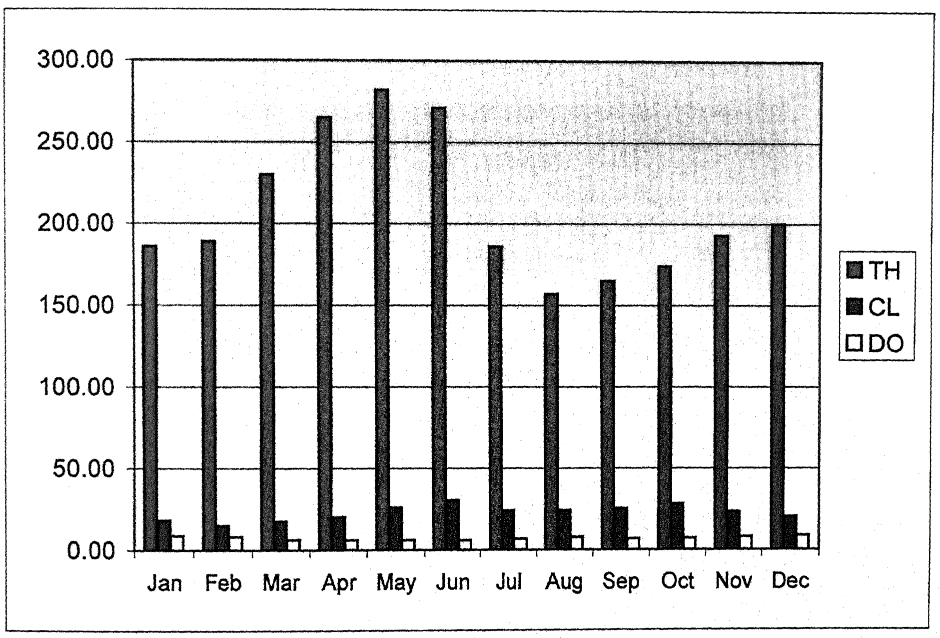


Fig-9

Bio-Chemical Oxygen Demand (ppm)
Chemical Oxygen Demand (ppm)
Ammonical nitrogen (ppm)

Station P1

Period- 2005

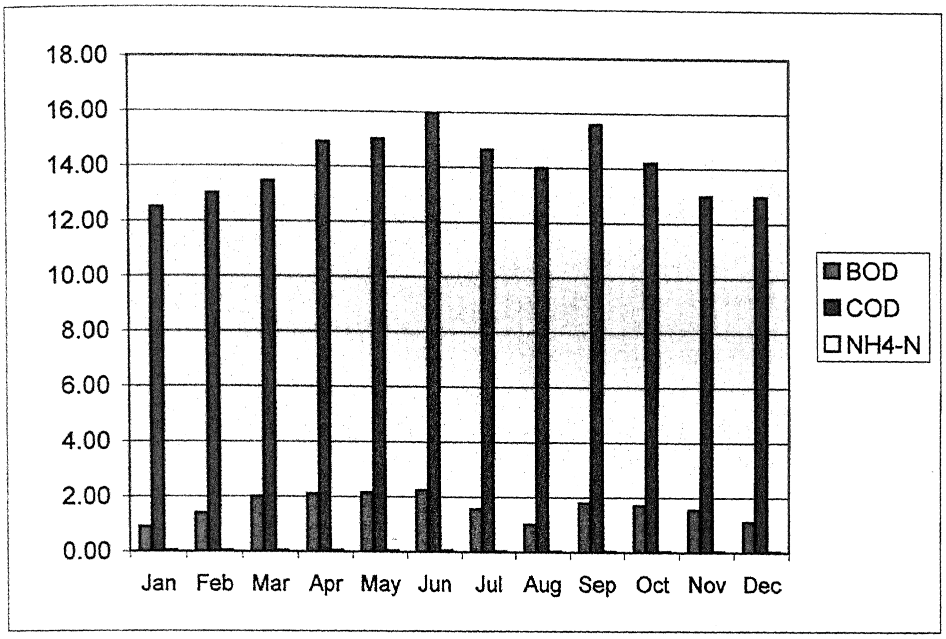


Fig-10

Station P1

Period- 2006

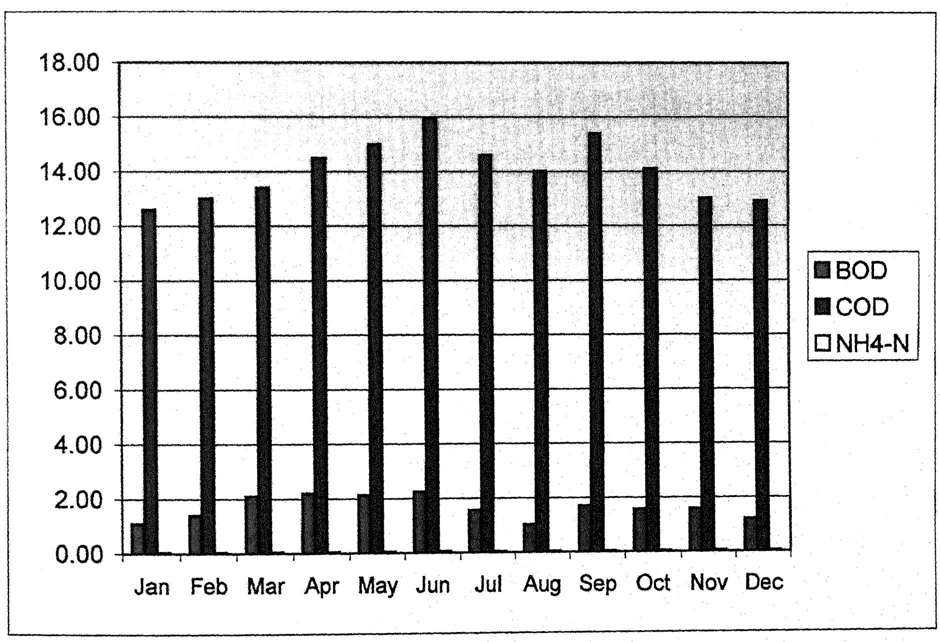


Fig-11

Nitrite (ppm), Nitrate (ppm), Phosphate (ppm)

Station P1

Period- 2005

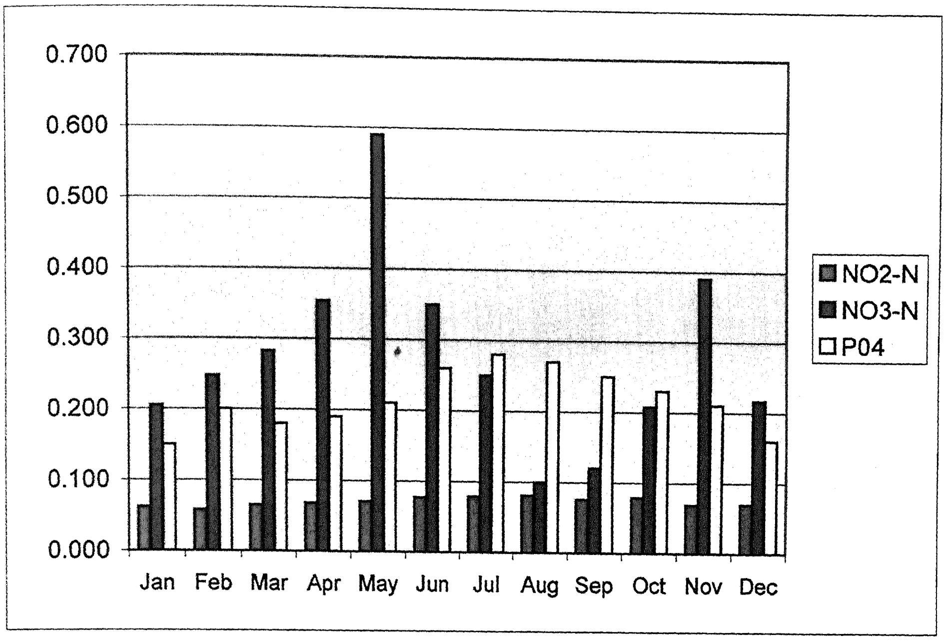


Fig-12

Station P1

Period- 2006

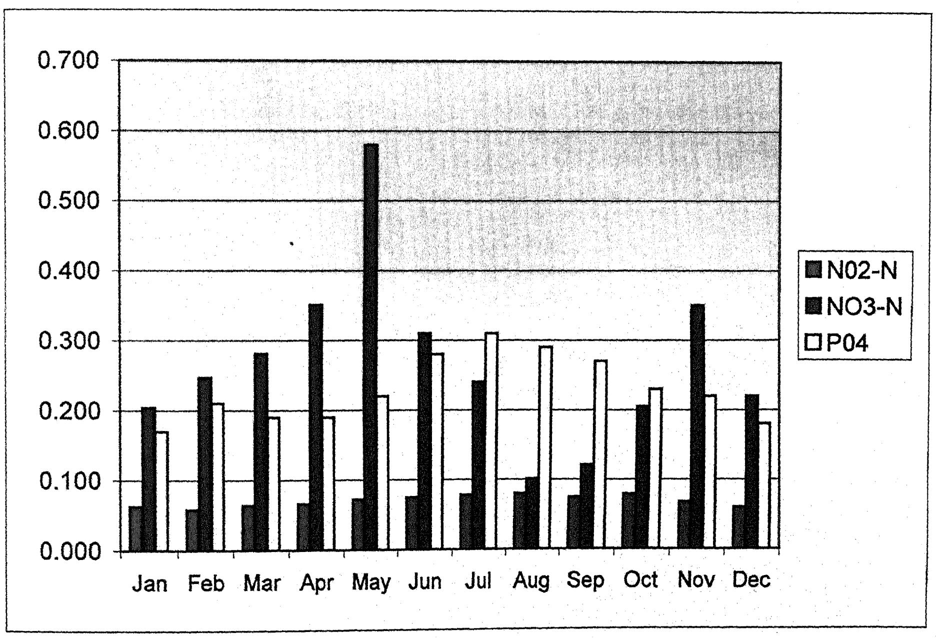


Fig-13

Sulphate (ppm), Sodium (ppm)
Potassium (ppm)

Station P1

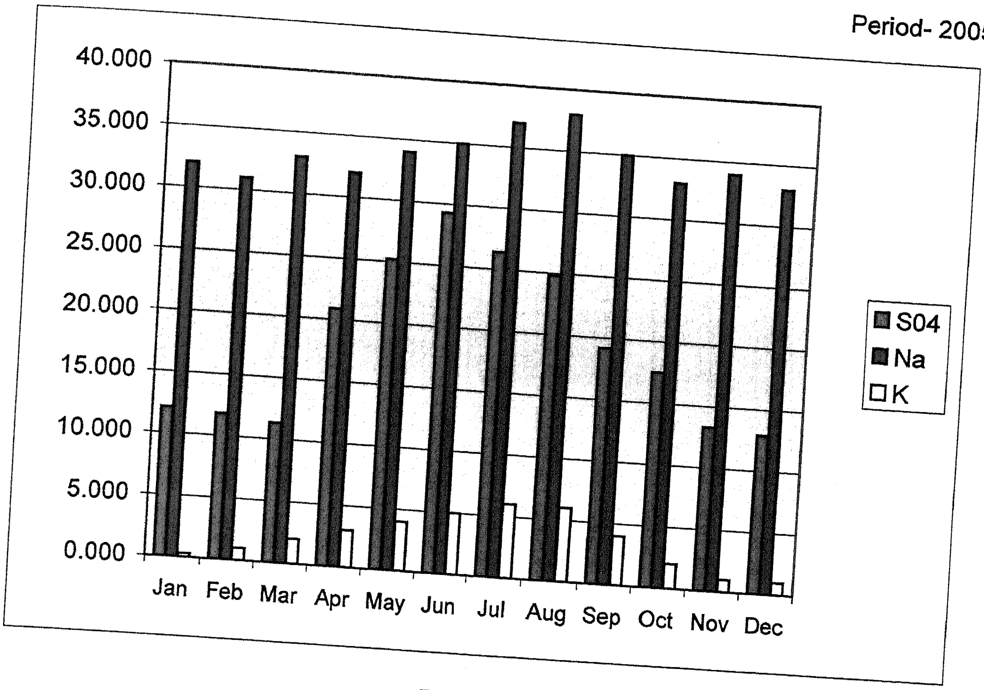


Fig-14

Station P1

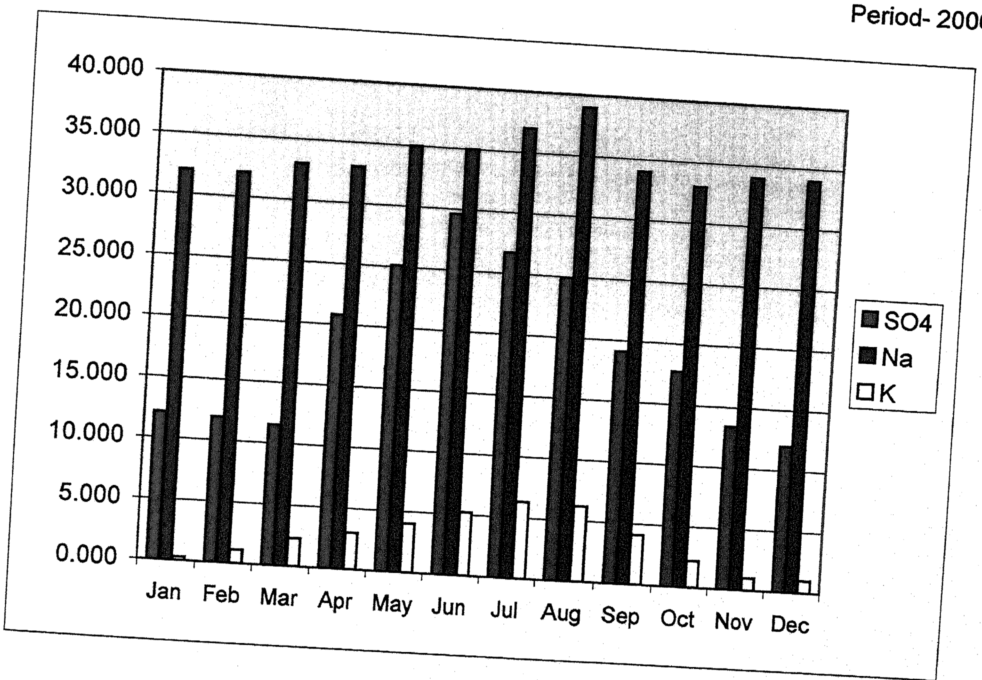


Fig-15

Carbon-di-oxide (ppm) Flouride (ppm)

Station P1

Period- 2005

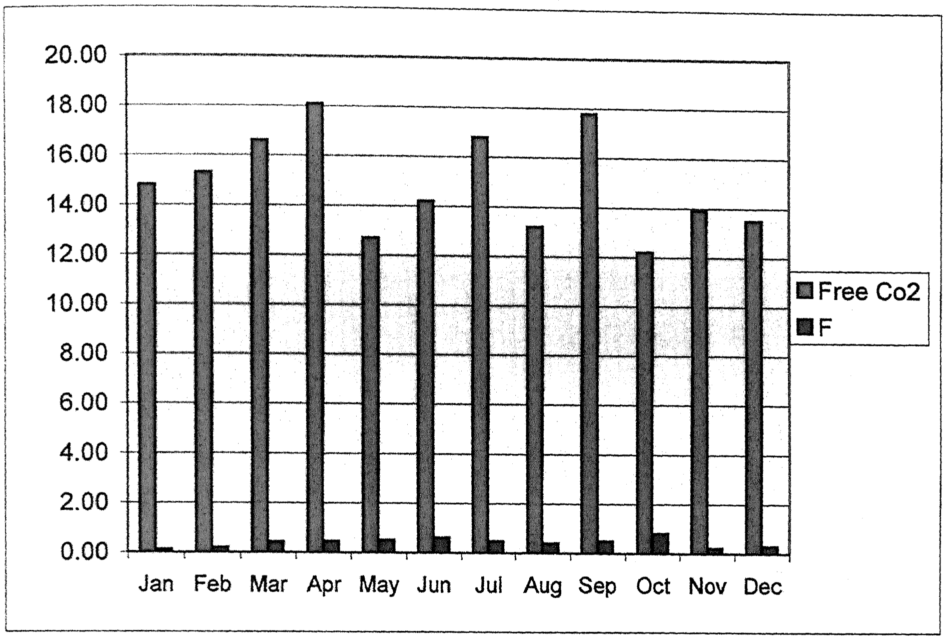


Fig-16

Station P1

Period- 2006

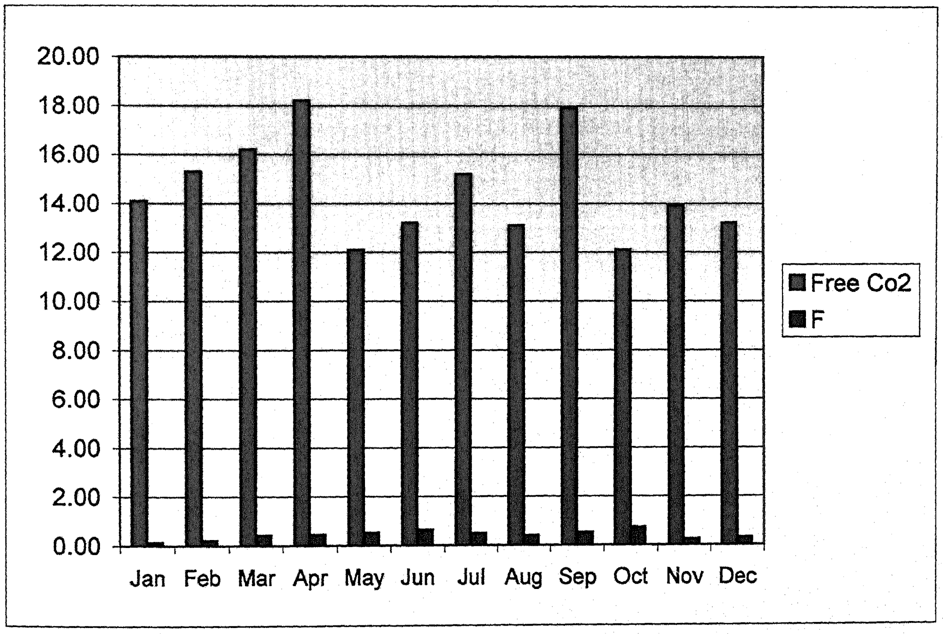


Fig-17

Water current Cu/Sec
Total Colifrom (MPN)

Station P1

Period- 2005

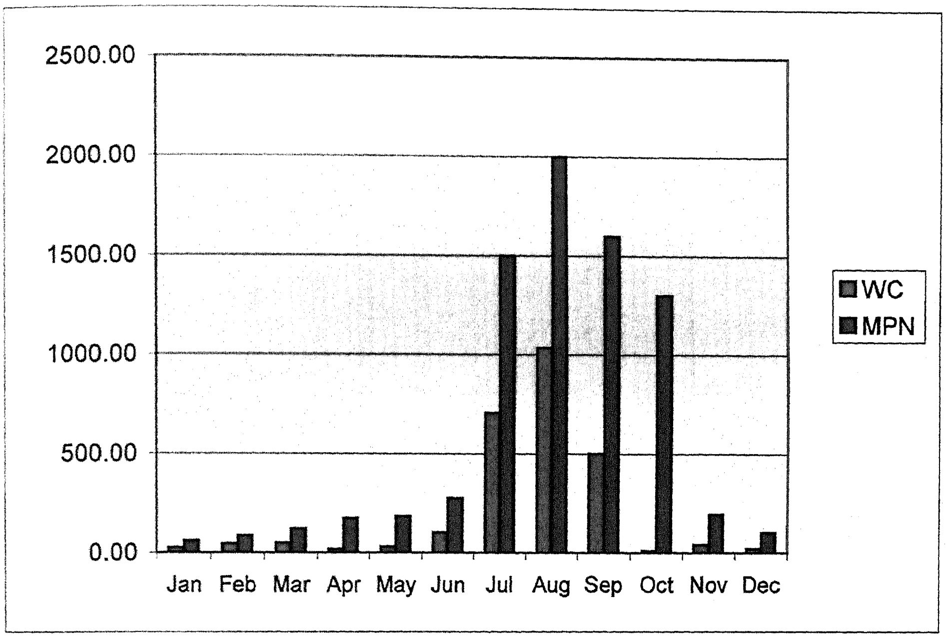


Fig-18

Station P1

Period- 2006

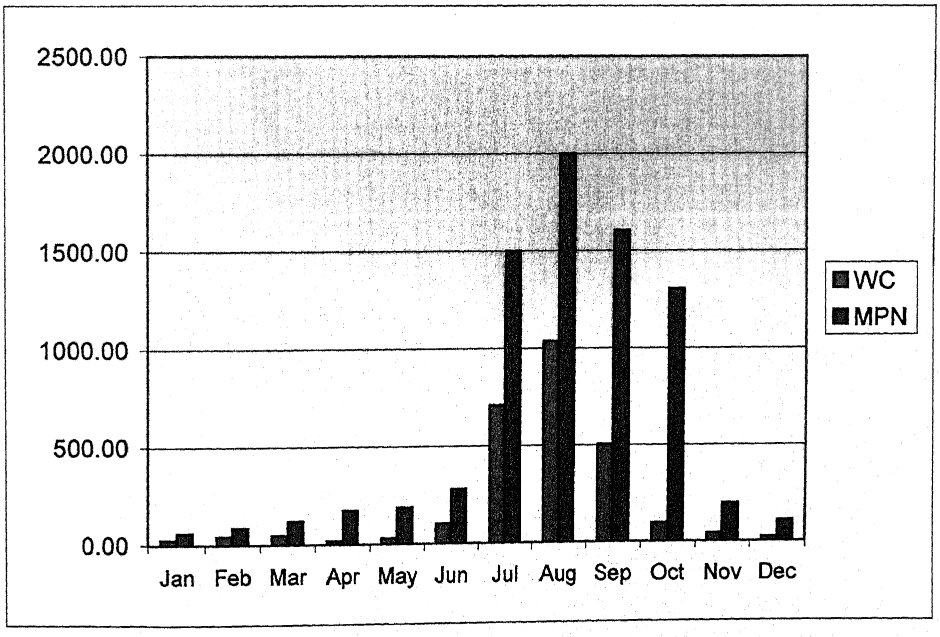


Fig-19

Water Temperature ($_0$C) Turididity (N.T.U.) Hydrogenion Concontration

Station P2

Period- 2005

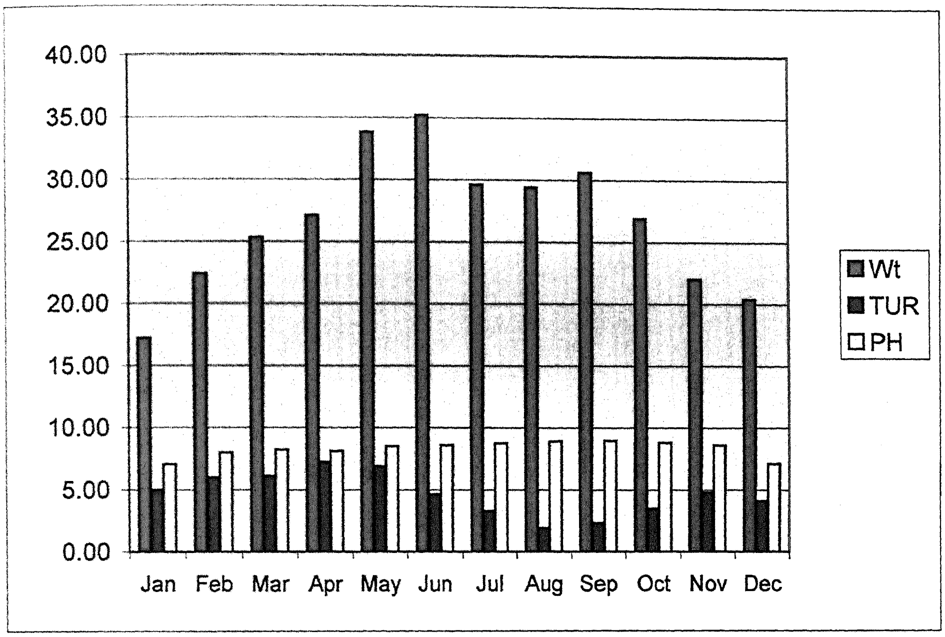


Fig-20

Station P2

Period- 2006

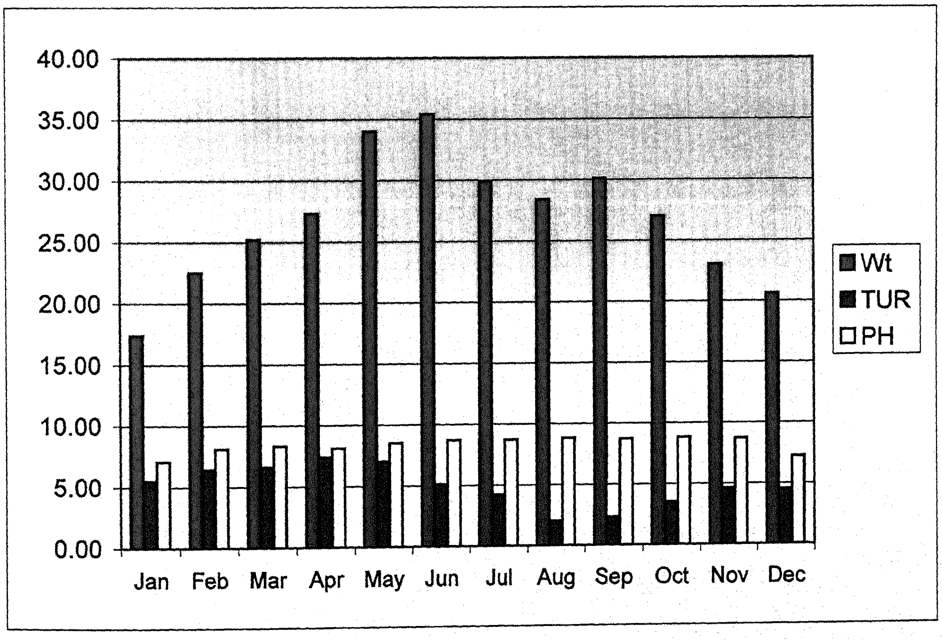


Fig-21

Carbonates (ppm) Bicarbonates (ppm) Total alkalinity (ppm)

Station P2 Period- 2005

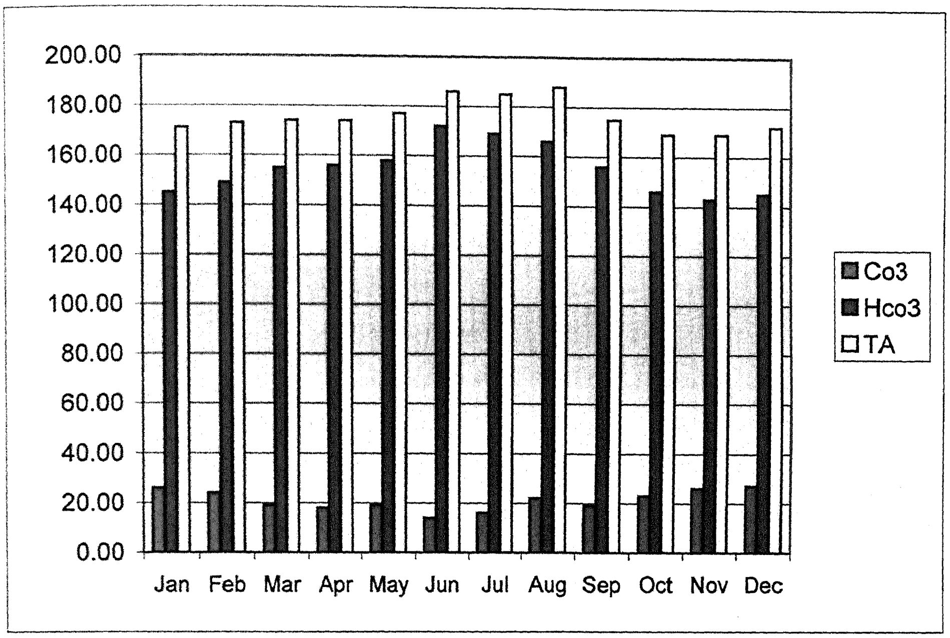


Fig-22

Station P2 Period- 2006

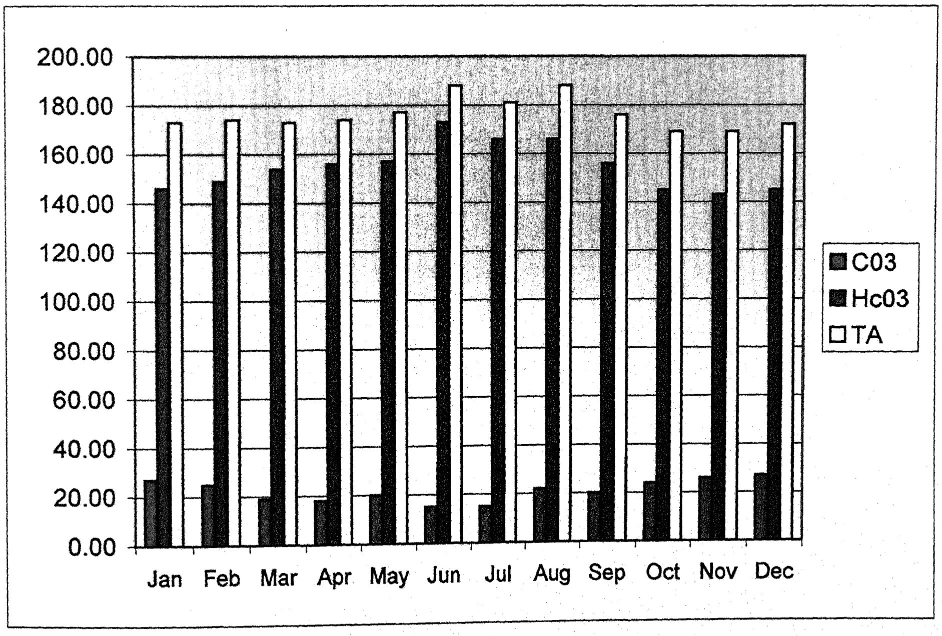


Fig-23

Total Hardness (ppm) Chlorides (ppm) Dissolved oxygen (ppm)

Station P2

Period- 2005

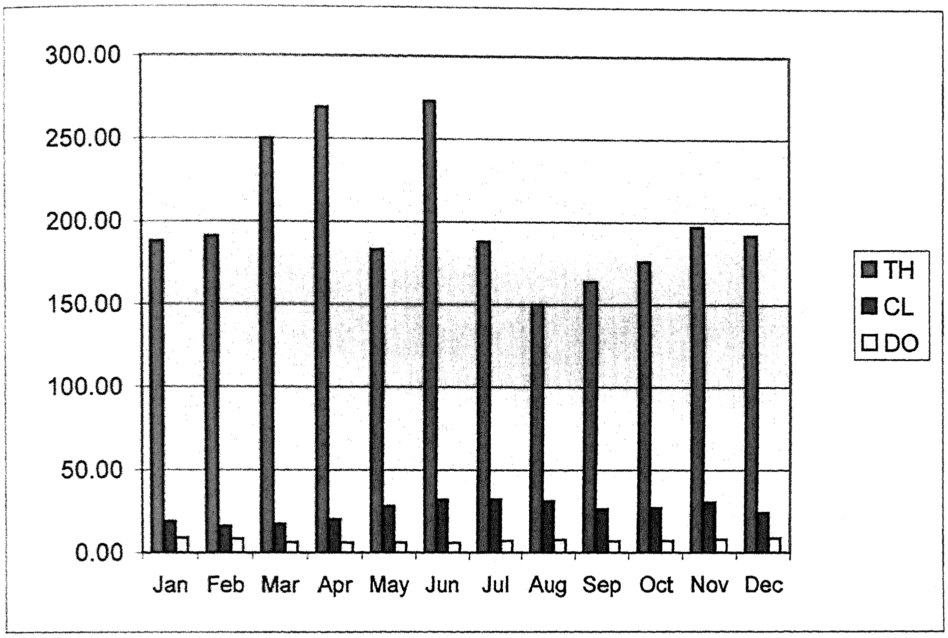


Fig-24

Station P2

Period- 2006

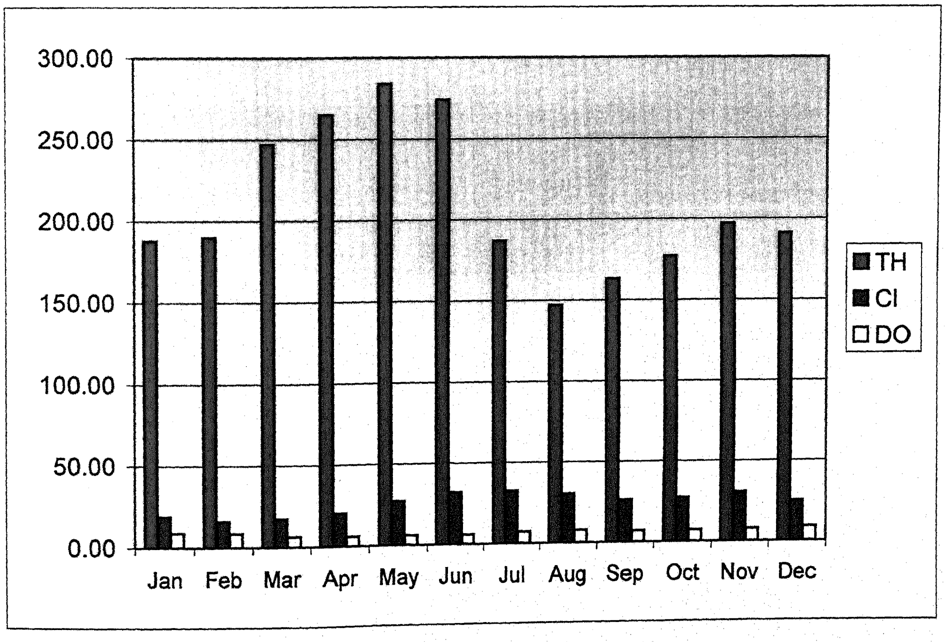


Fig-25

Bio-Chemical Oxygen Demand (ppm)
Chemical Oxygen Demand (ppm)
Ammonical nitrogen (ppm)

Station P2

Period- 2005

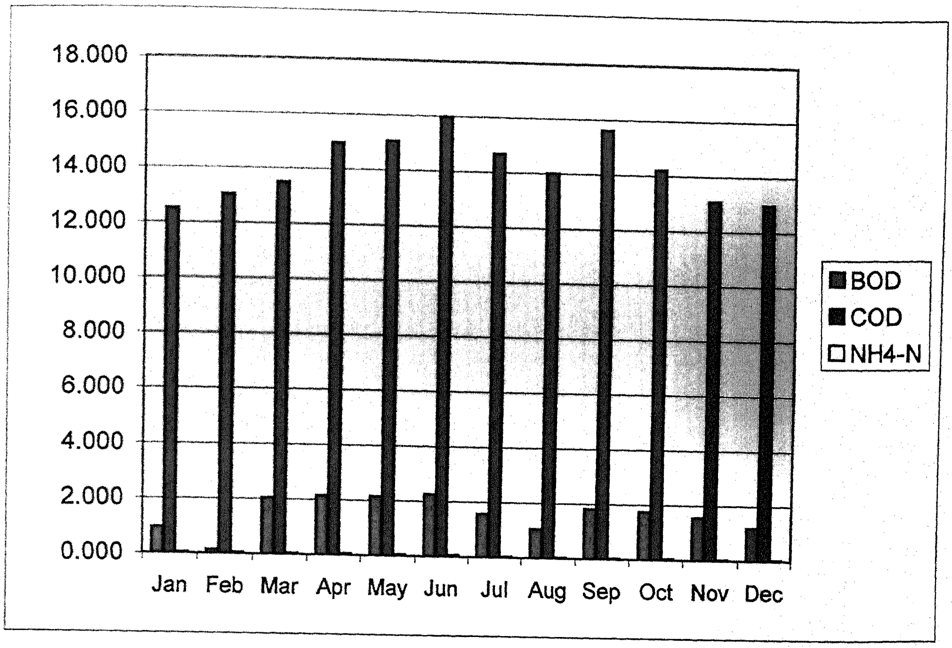


Fig-26

Station P2

Period- 2006

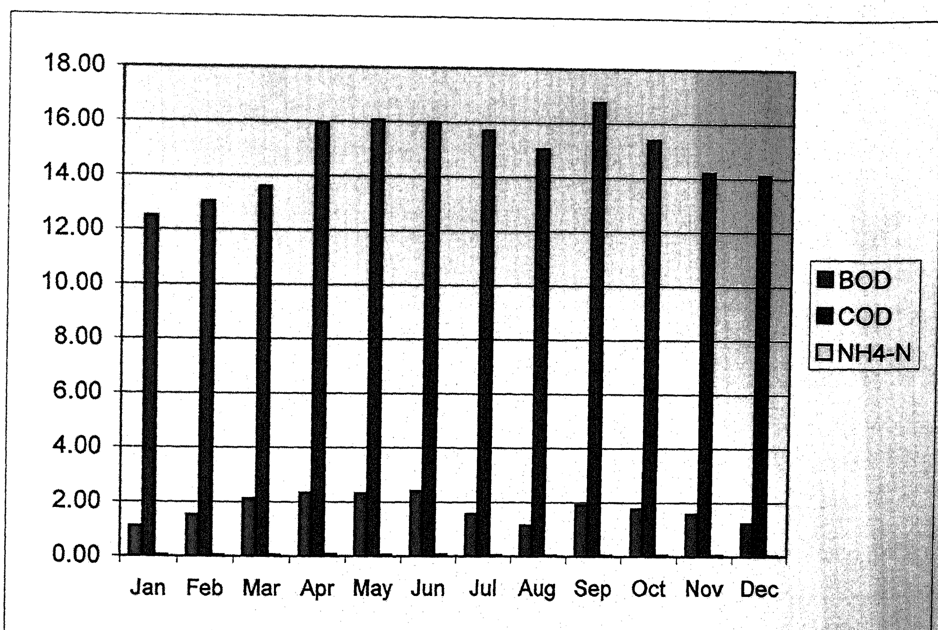


Fig-27

Nitrite ((ppm) Nitrate (ppm) Phosphate (ppm)

Station P2

Period- 2005

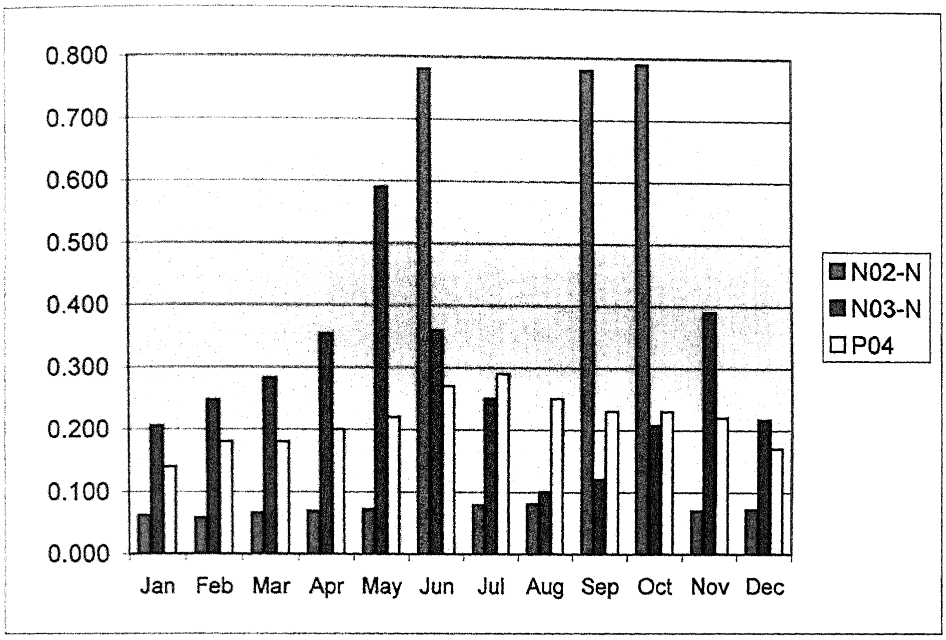


Fig-28

Station P2

Period- 2006

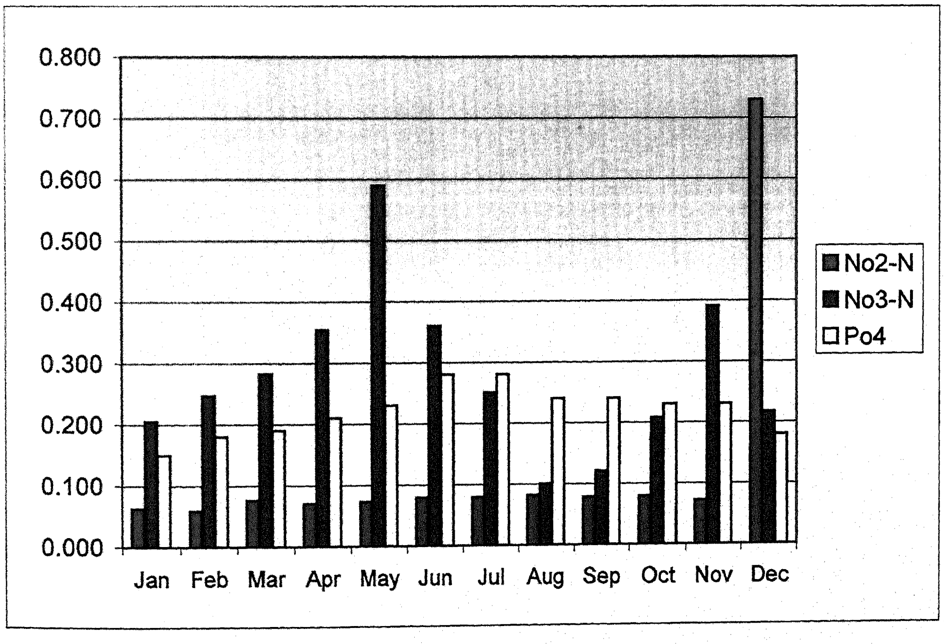


Fig-29

Sulphate (ppm) Sodium (ppm) Potassium (ppm)

Station P2 Period- 2005

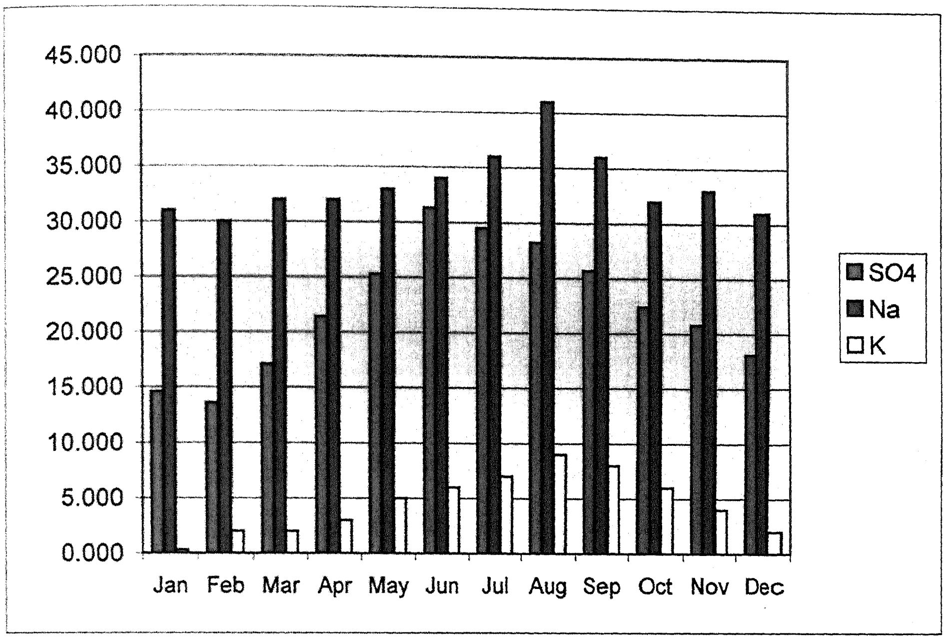


Fig-30

Station P2 Period- 2006

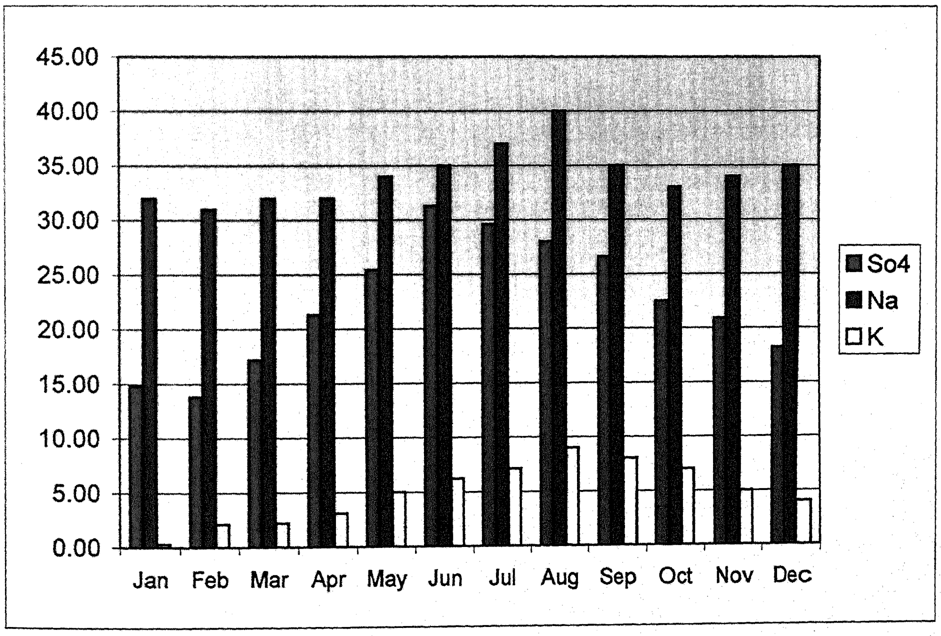


Fig-31

Carbon-di-oxide (ppm), Flouride (ppm)

Station P2

Period- 2005

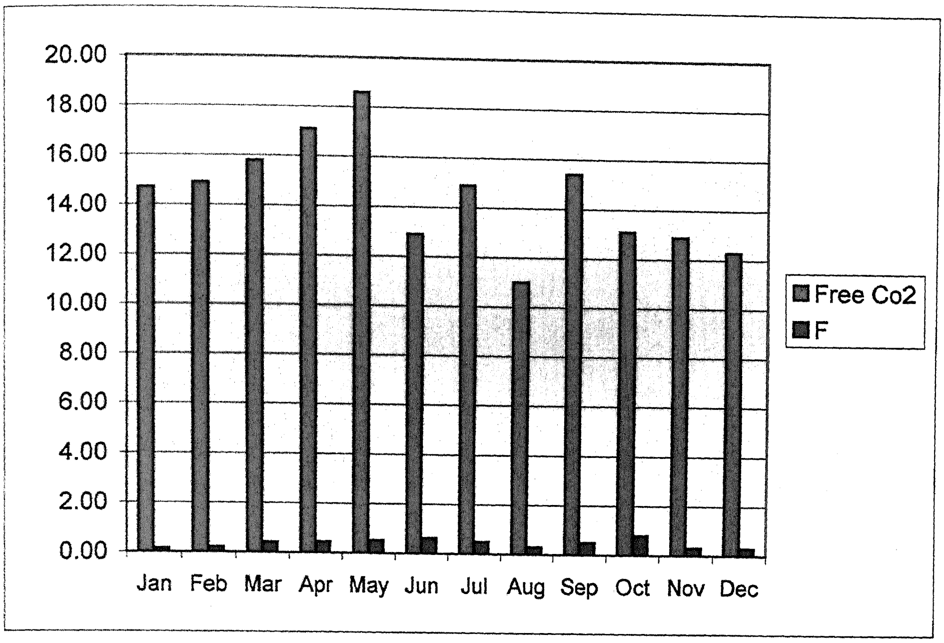


Fig-32

Station P2

Period- 2006

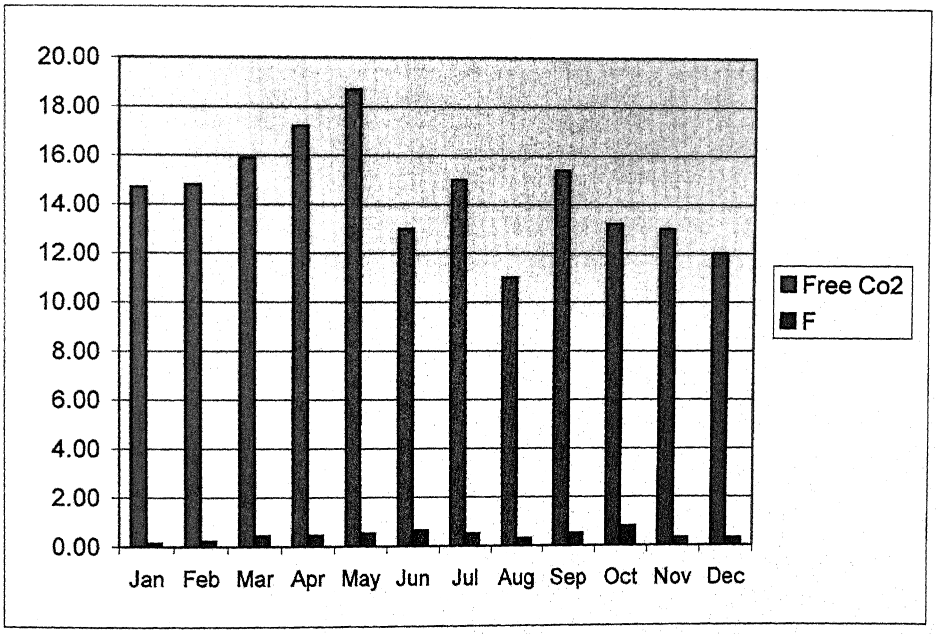


Fig-33

Water Current (Cu/Sec)
Total Coliform (MPN)

Station P2

Period- 2005

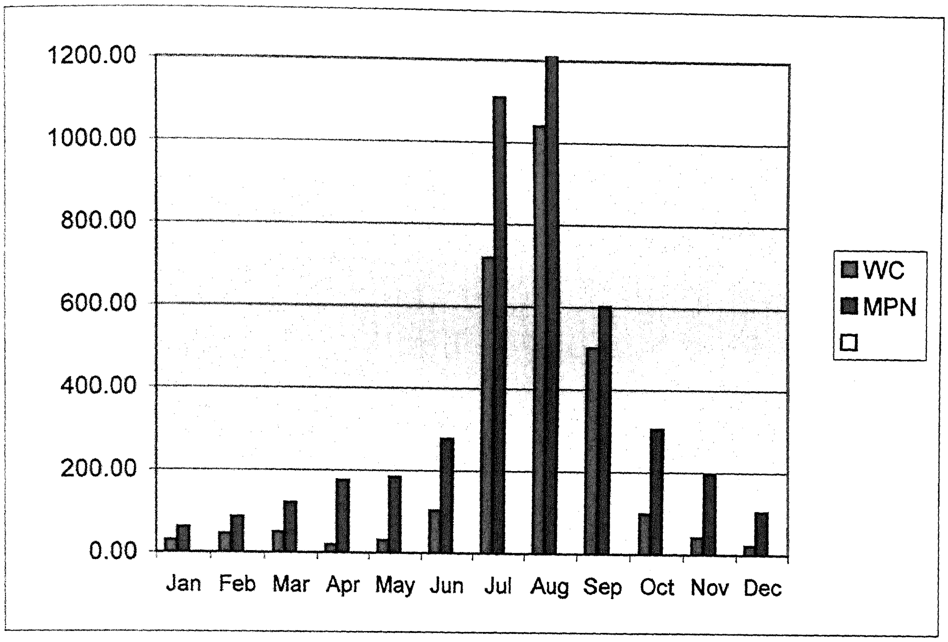


Fig-34

Station P2

Period- 2006

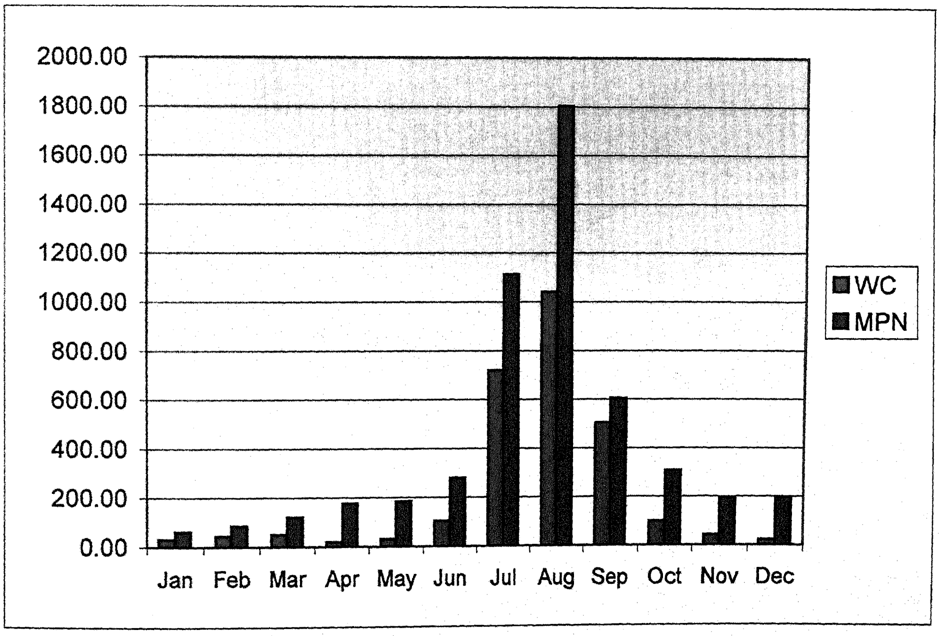


Fig-35

Water Temperature (oC) Turbidity (N.T.U.) Hydrogenion Concontration

Station P3 Period- 2005

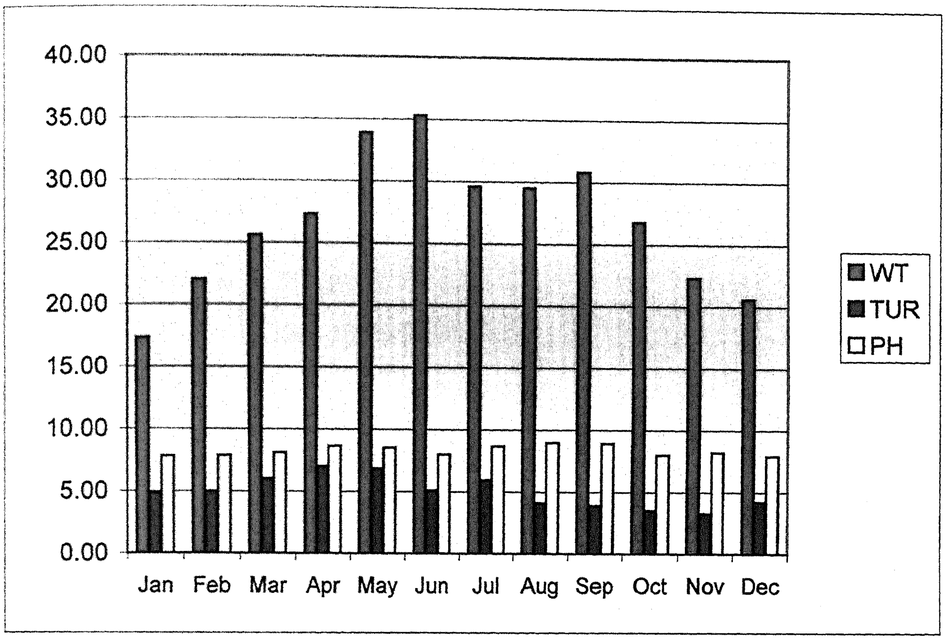


Fig-36

Station P3 Period- 2006

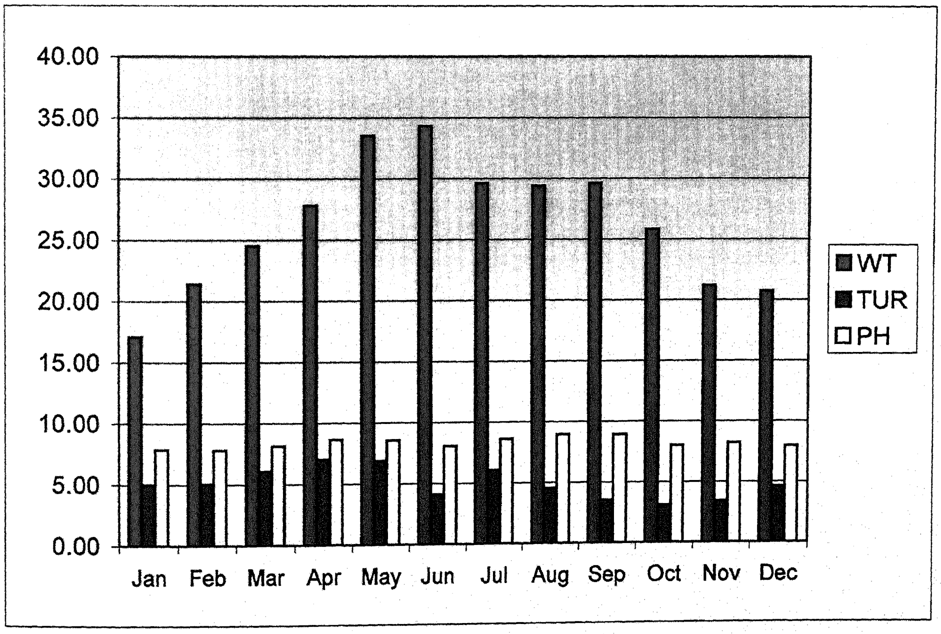


Fig-37

Carbonates (ppm) Bicarbonates (ppm) Total Alkalinity (ppm)

Station P3

Period- 2005

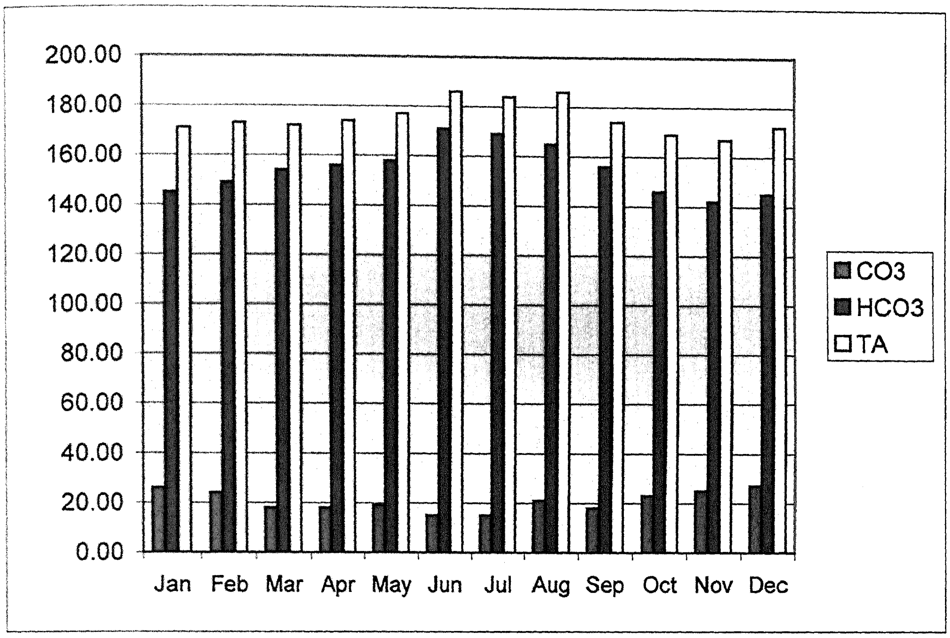


Fig-38

Station P3

Period- 2006

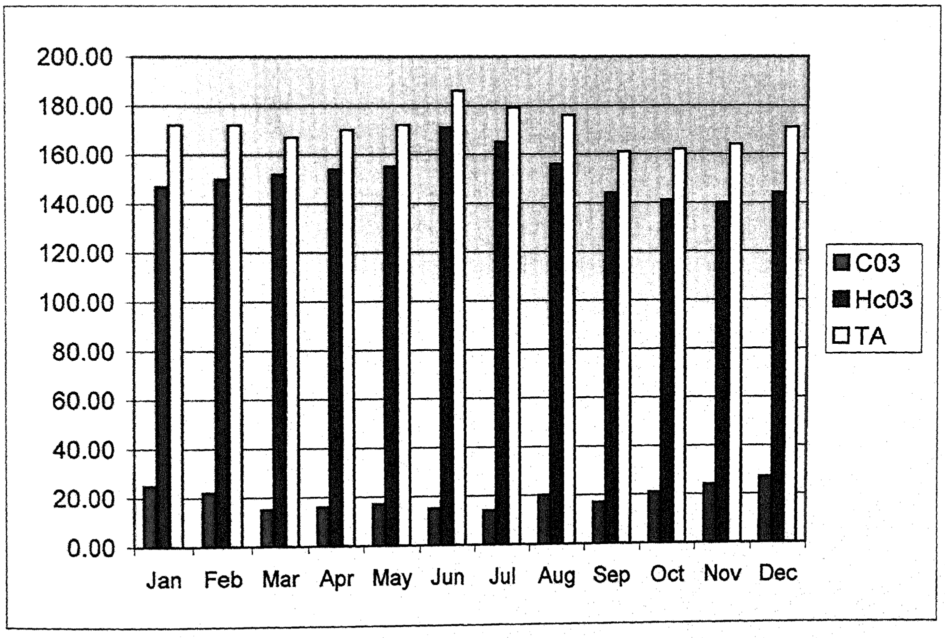


Fig-39

Total Hardness (ppm) Chlorides (ppm) Dissolved oxygen (ppm)

Station P3

Period- 2005

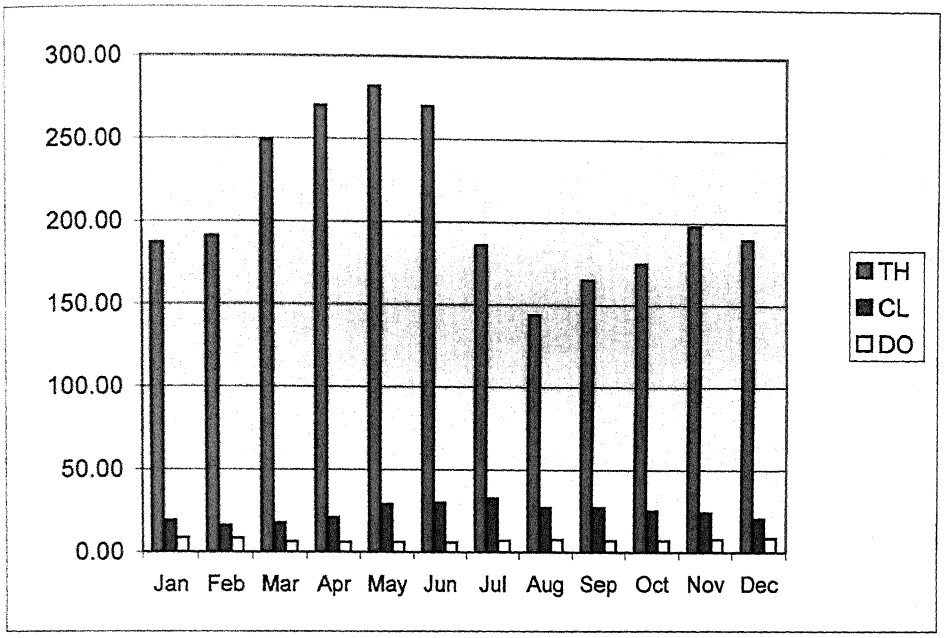


Fig-40

Station P3

Period- 2006

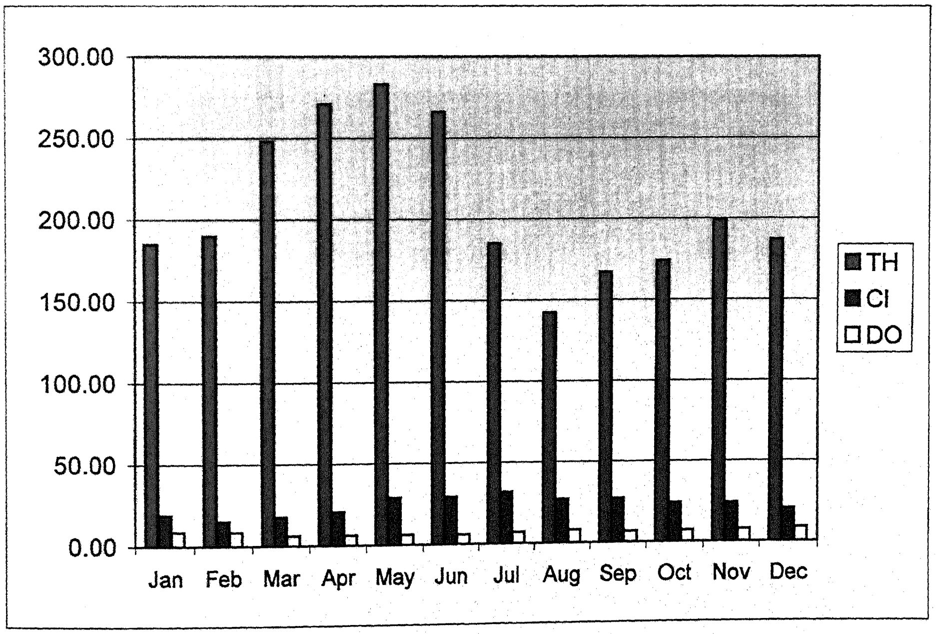


Fig-41

Biochemical oxygen Demand (ppm)
Chemical oxygen Demand (ppm)
Ammonical Nitrogen (ppm)

Station P3 Period- 2005

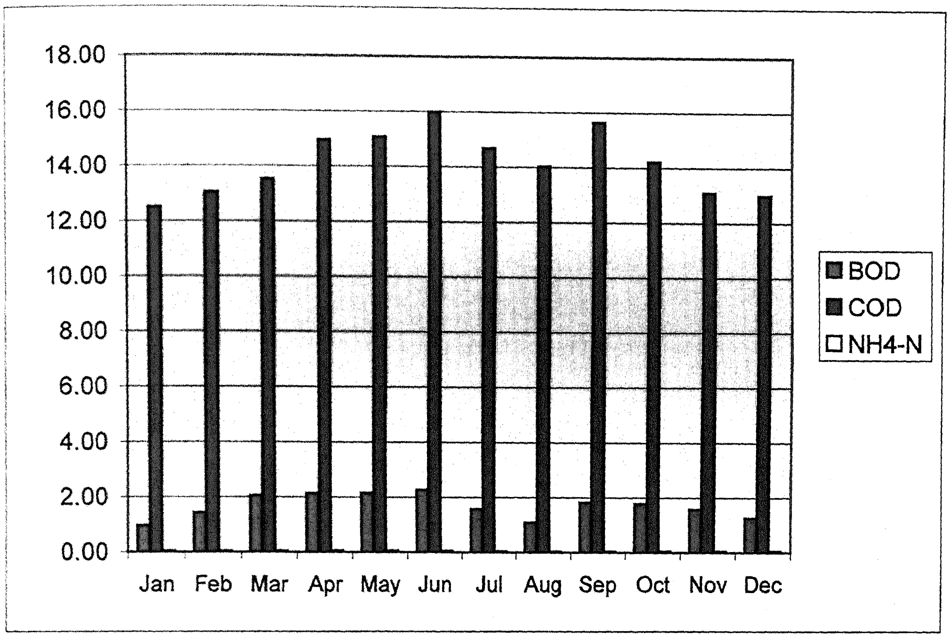


Fig-42

Station P3 Period- 2006

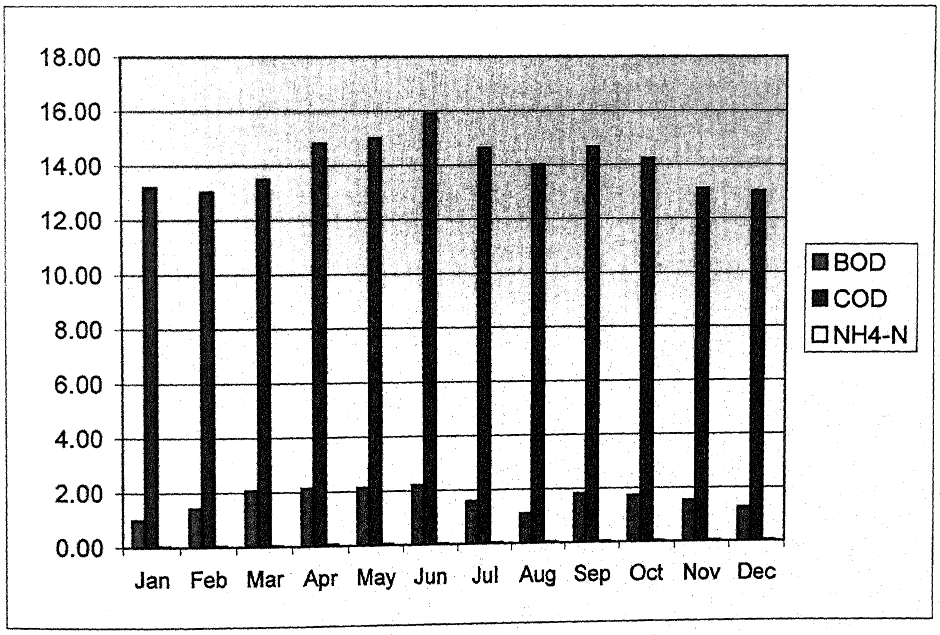


Fig-43

Nitrite (ppm), Nitrate (ppm), Phosphate (ppm)

Station P3

Period- 2005

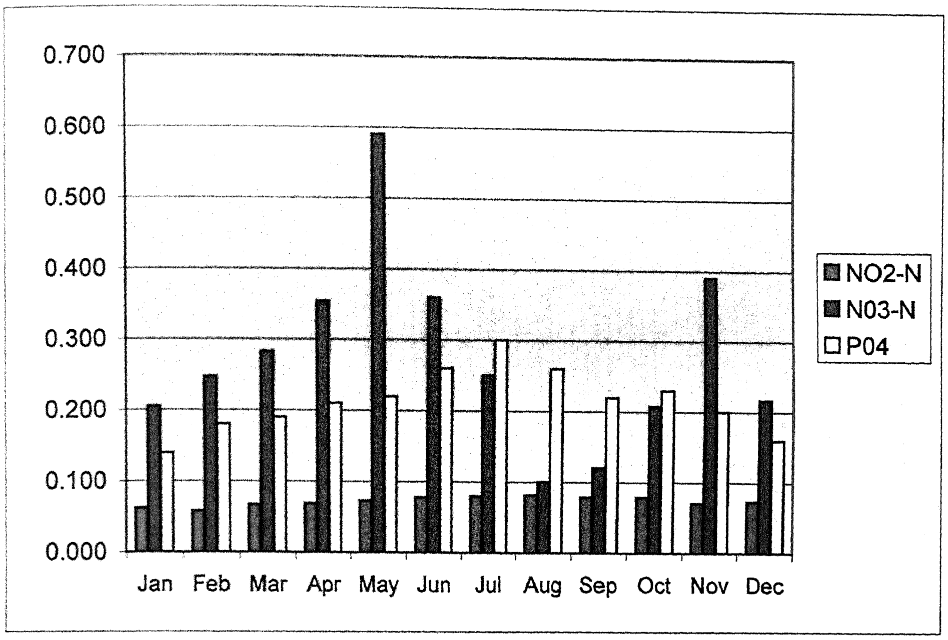


Fig-44

Station P3

Period- 2006

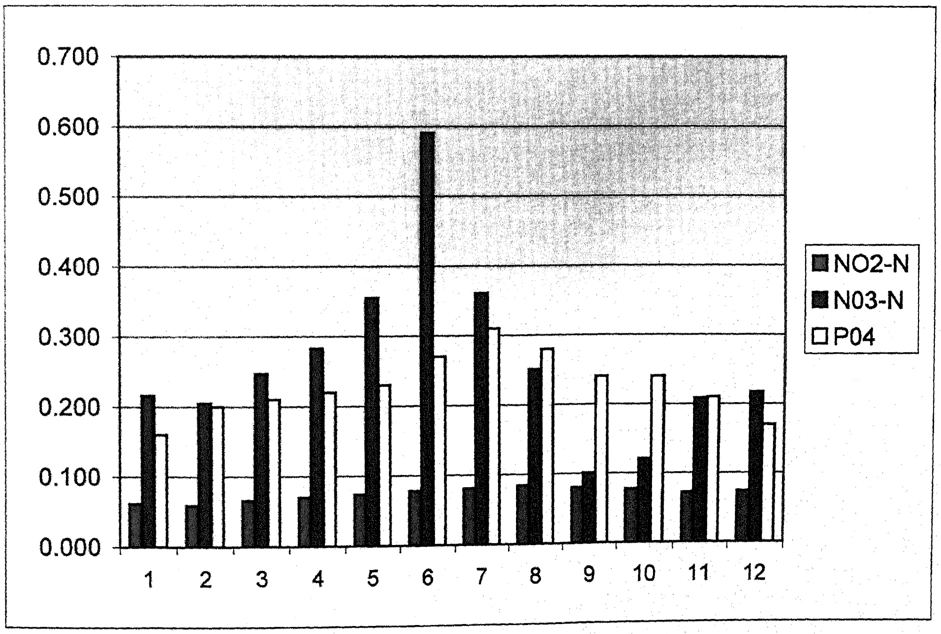


Fig-45

Sulphate (ppm), Sodium (ppm)
Potassium (ppm)

Station P3 Period- 2005

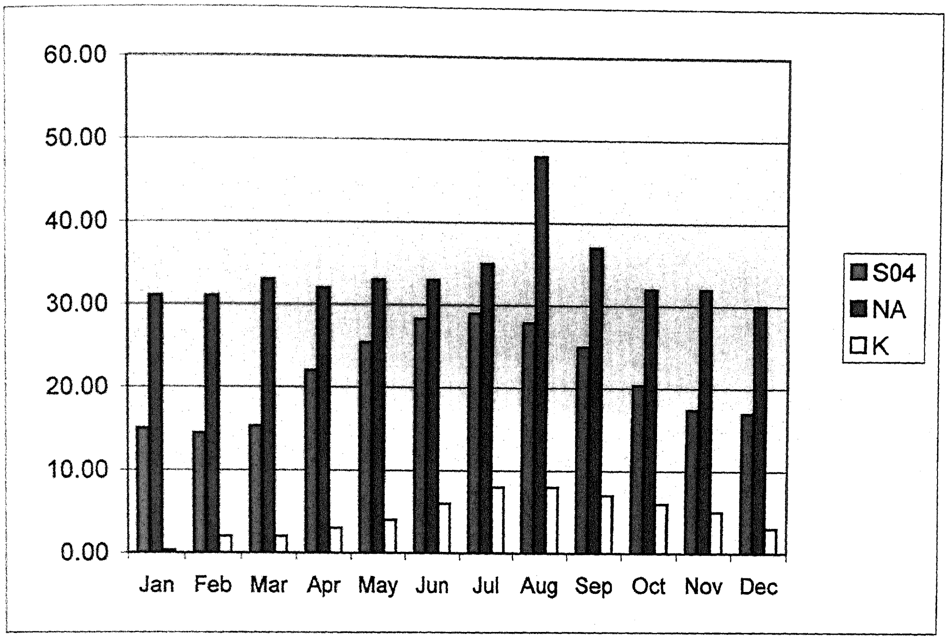


Fig-46

Station P3 Period- 2006

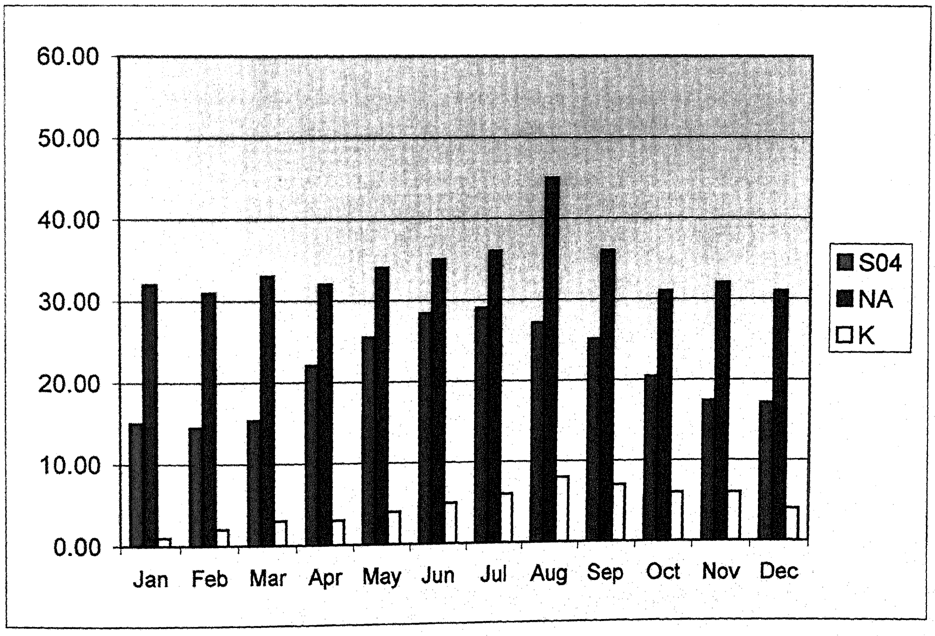


Fig-47

Carbon-di-oxide (ppm), Flouride (ppm)

Station P3

Period- 2005

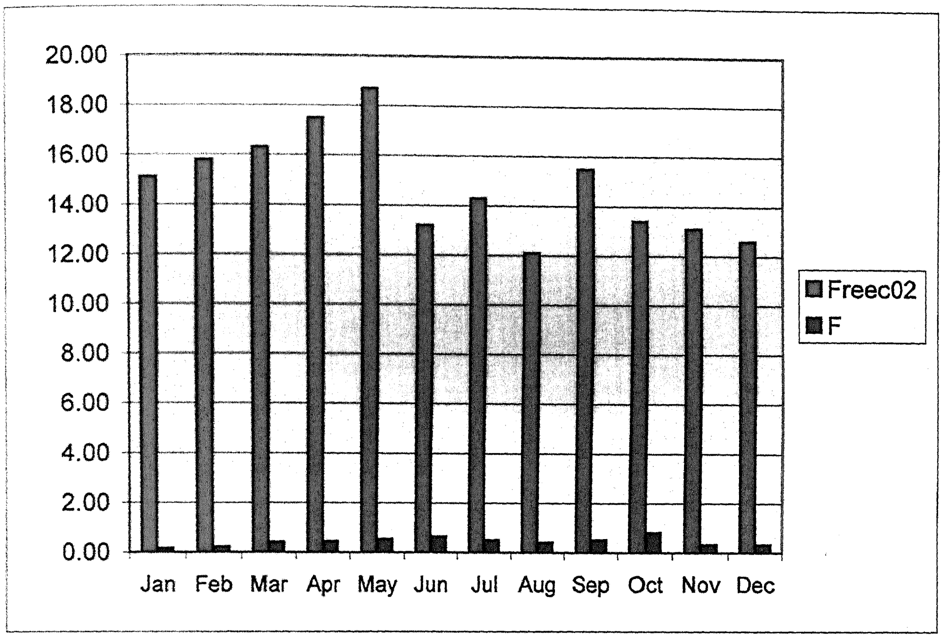


Fig-48

Station P3

Period- 2006

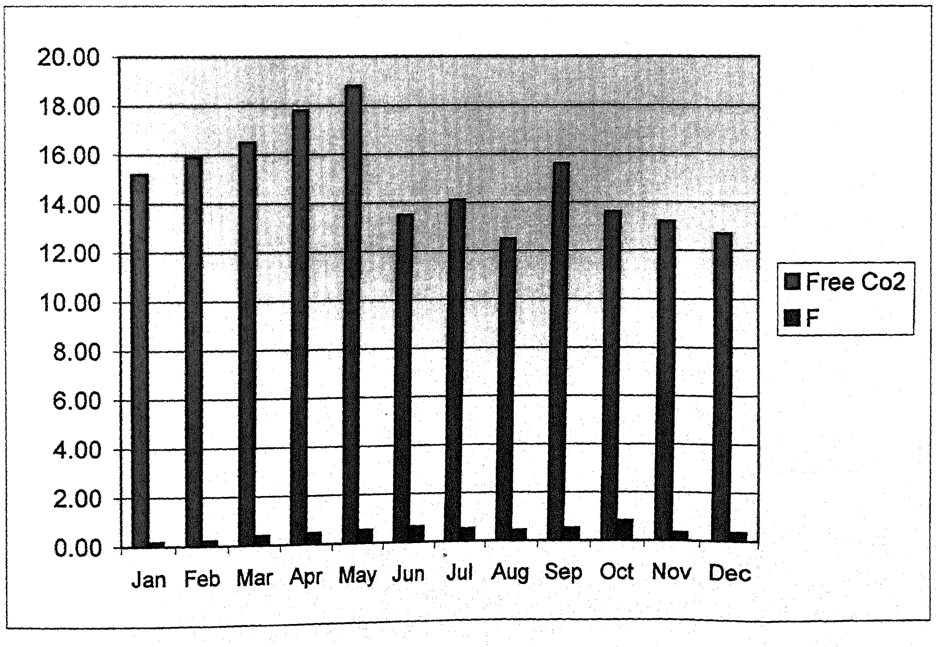


Fig-49

Water Current (Cu/Sec)
Total Colifrom (MPN)

Station P3

Period- 2005

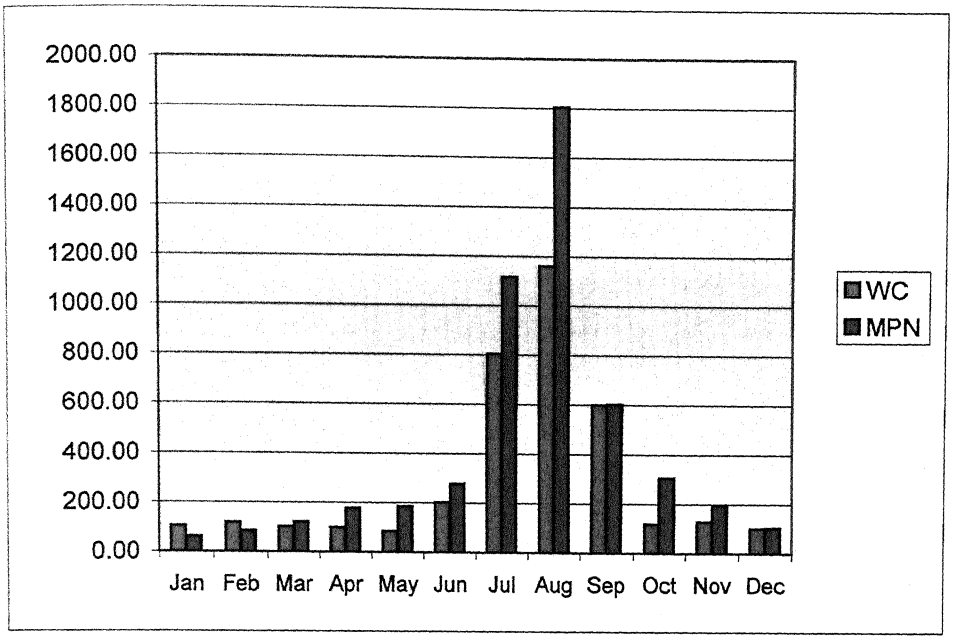


Fig-50

Station P3

Period- 2006

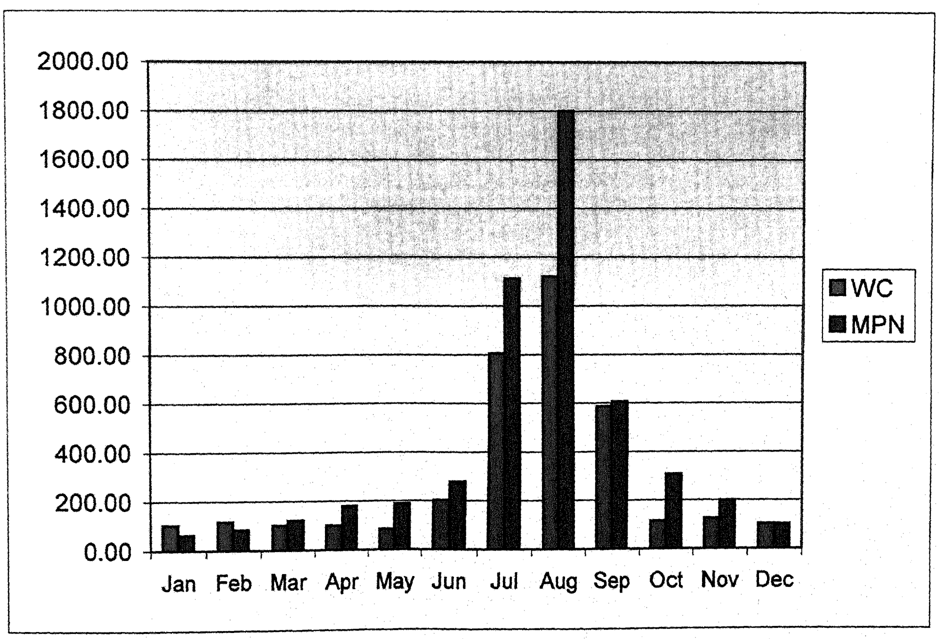


Fig-51

Water Temperature ($_oC$) Turbidity (NTU) Hydrogen - ion Concentration

Station P4

Period- 2005

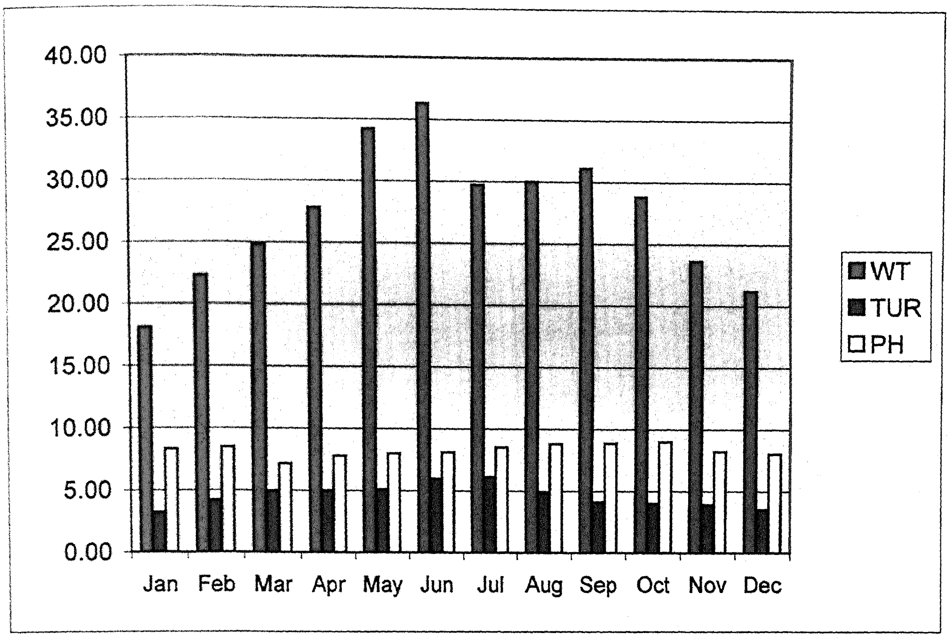


Fig-52

Station P4

Period- 2006

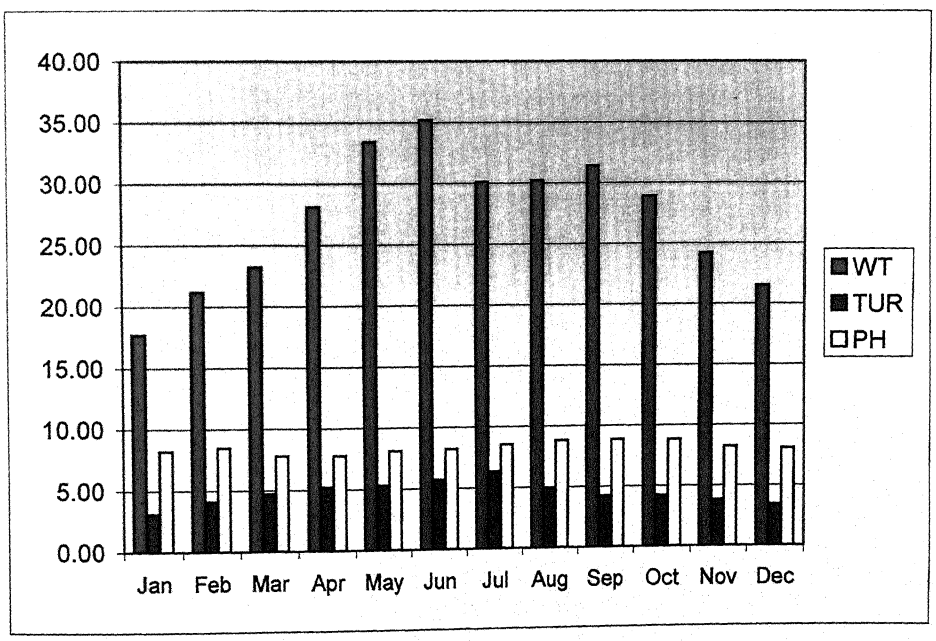


Fig-53

Carbonates (ppm) Bicarbonates (ppm) Total Alkalinity (ppm)

Station P4

Period- 2005

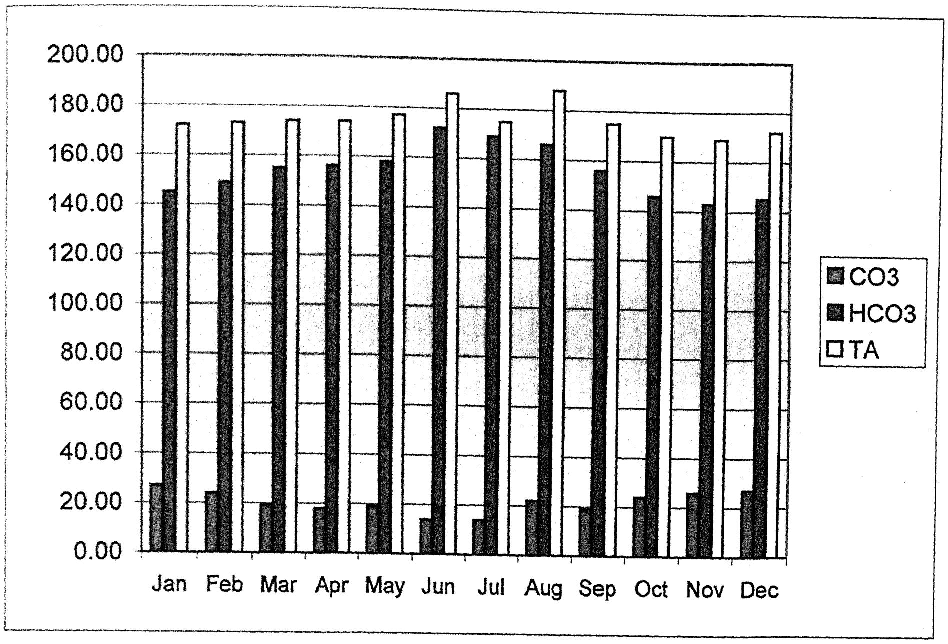


Fig-54

Station P4

Period- 2006

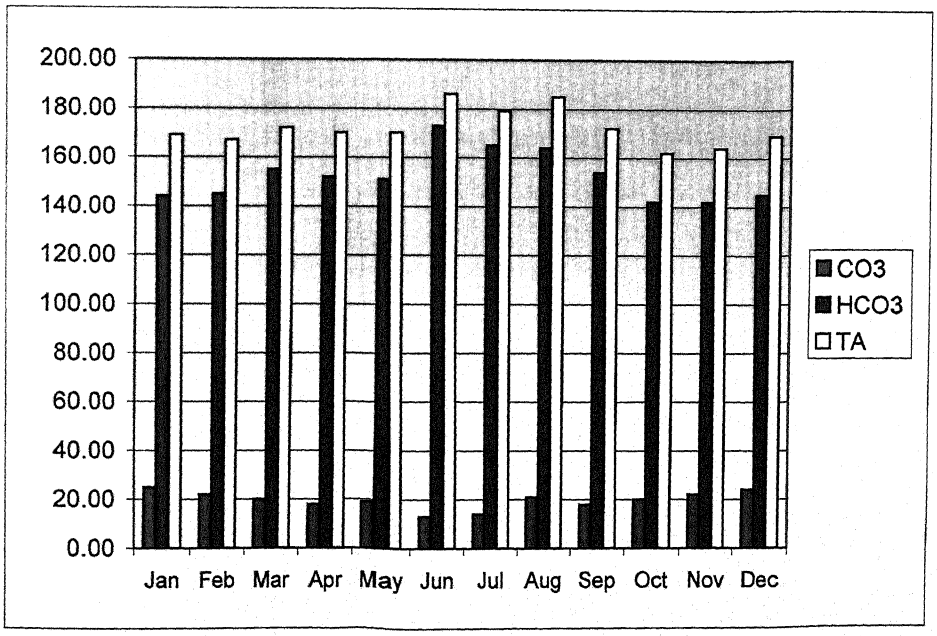


Fig-55

Total Hardness (ppm) Chlorides (ppm) Dissolved oxygen (ppm)

Station P4

Period- 2005

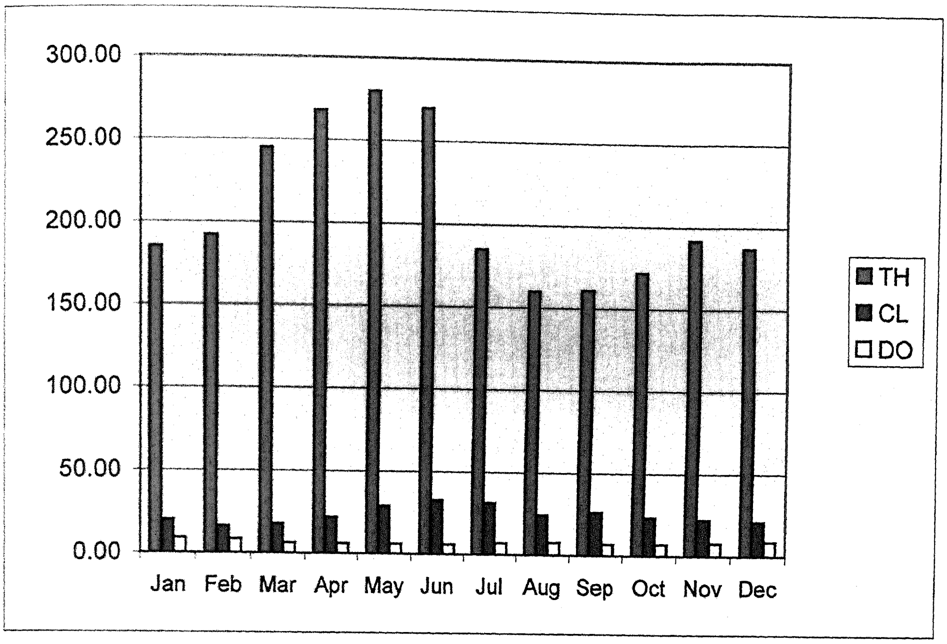


Fig-56

Station P4

Period- 2006

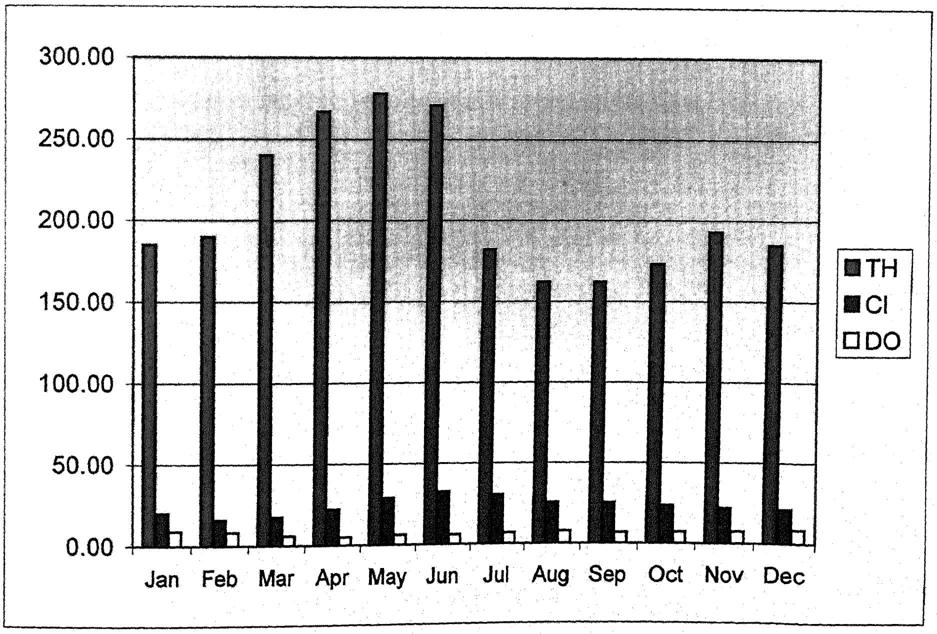


Fig-57

Bio Chemical oxygen Demand (ppm)
Chemical oxygen Demand (ppm)
Ammonical Nitrogen (ppm)

Station P4

Period- 2005

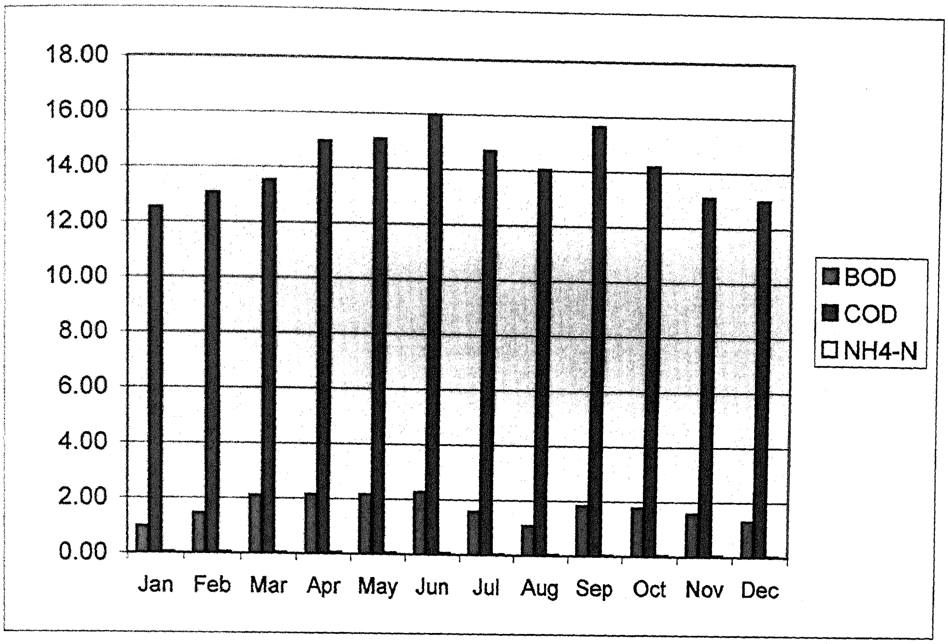


Fig-58

Station P4

Period- 2006

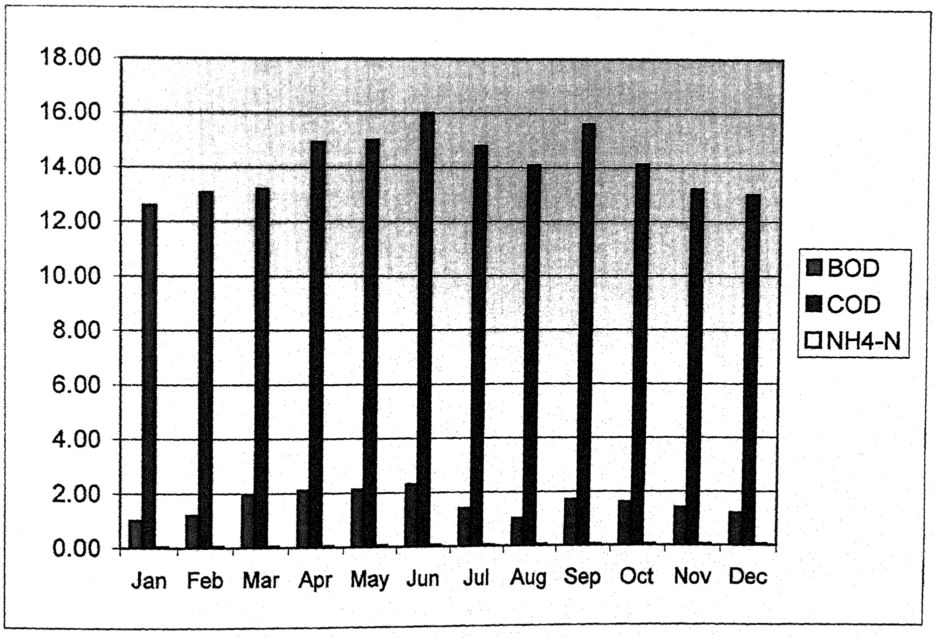


Fig-59

Nitrite (ppm), Nitrate (ppm),Phosphate (ppm)

Station P4

Period- 2005

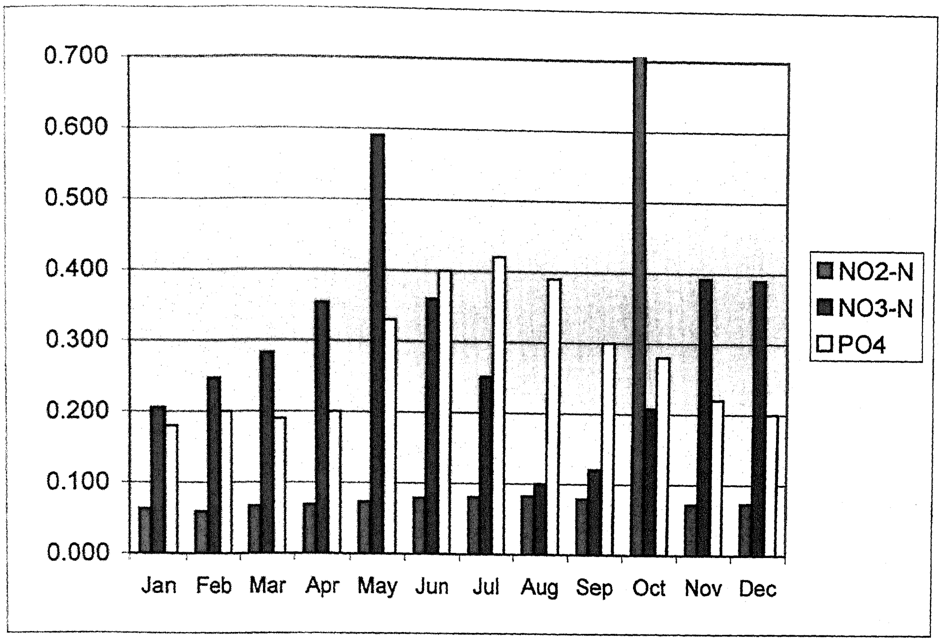


Fig-60

Station P4

Period- 2006

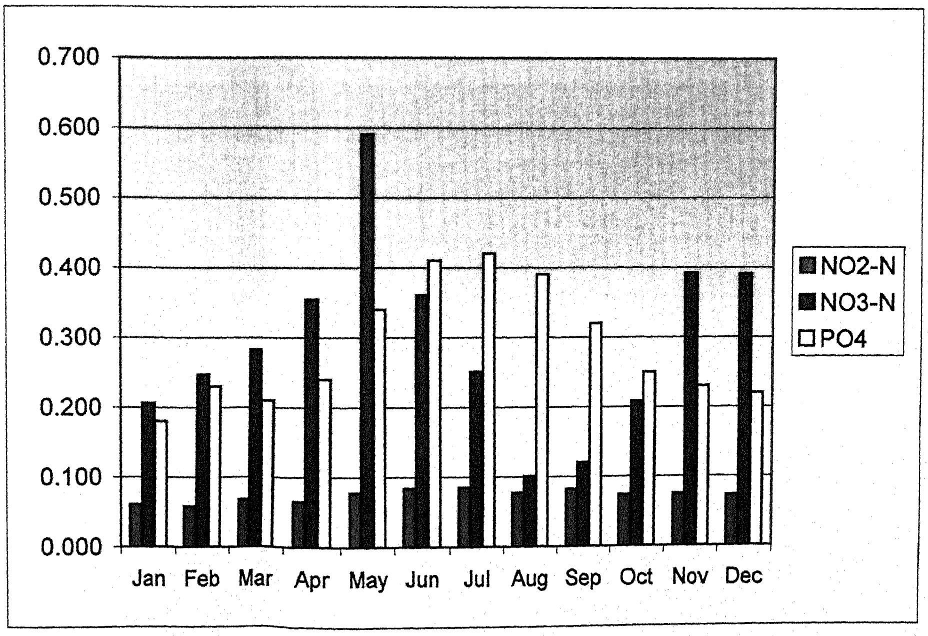


Fig-61

Sulphate (ppm), Sodium (ppm) Potassium (ppm)

Station P4

Period- 2005

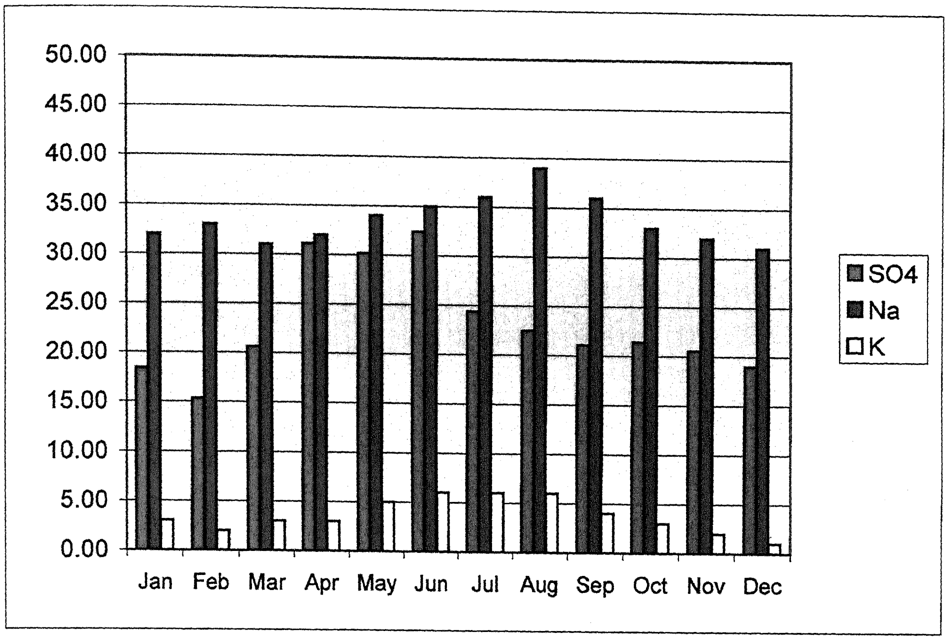


Fig-62

Station P4

Period- 2006

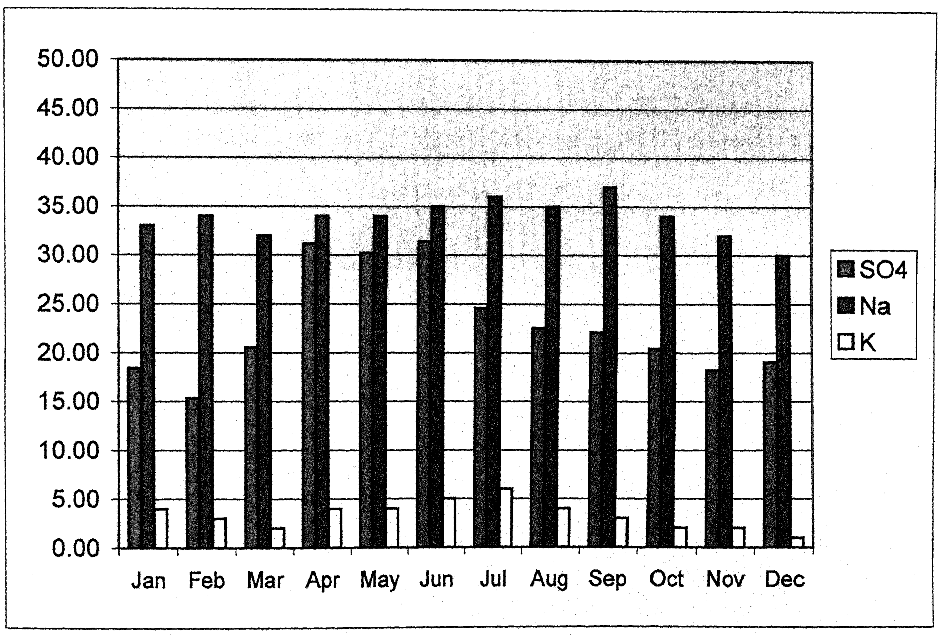


Fig-63

Free Carbon-di-oxide (ppm)
Flouride (ppm)

Station P4

Period- 2005

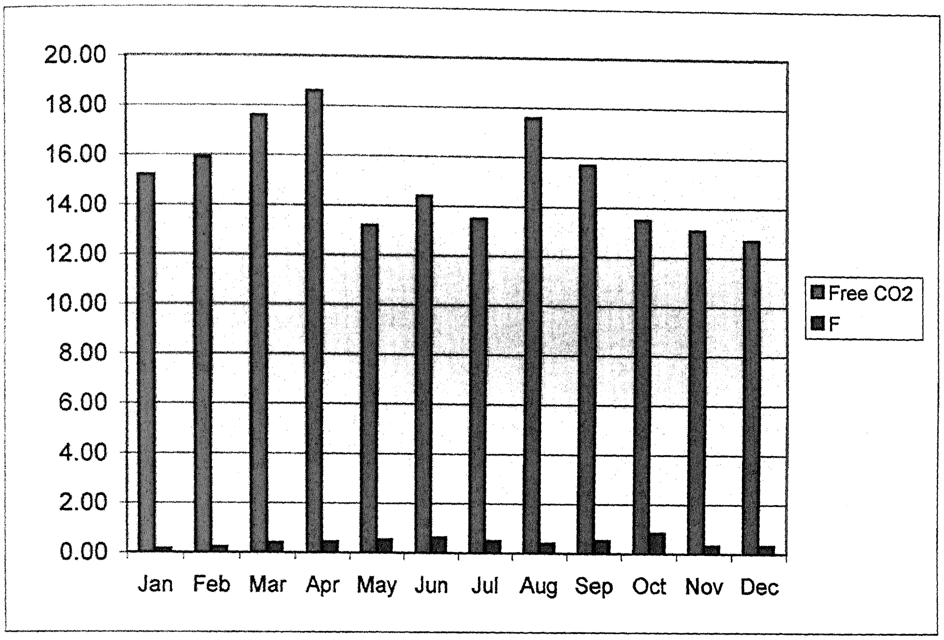


Fig-64

Station P4

Period- 2006

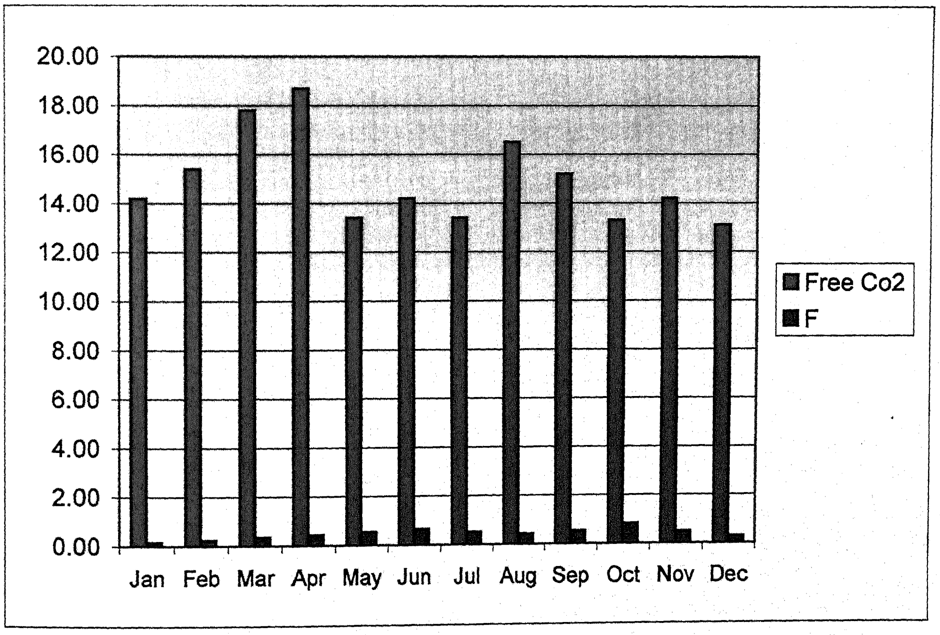


Fig-65

Water Current (Cu/Sec)
Total Coliforam (MPN)

Station P4

Period- 2005

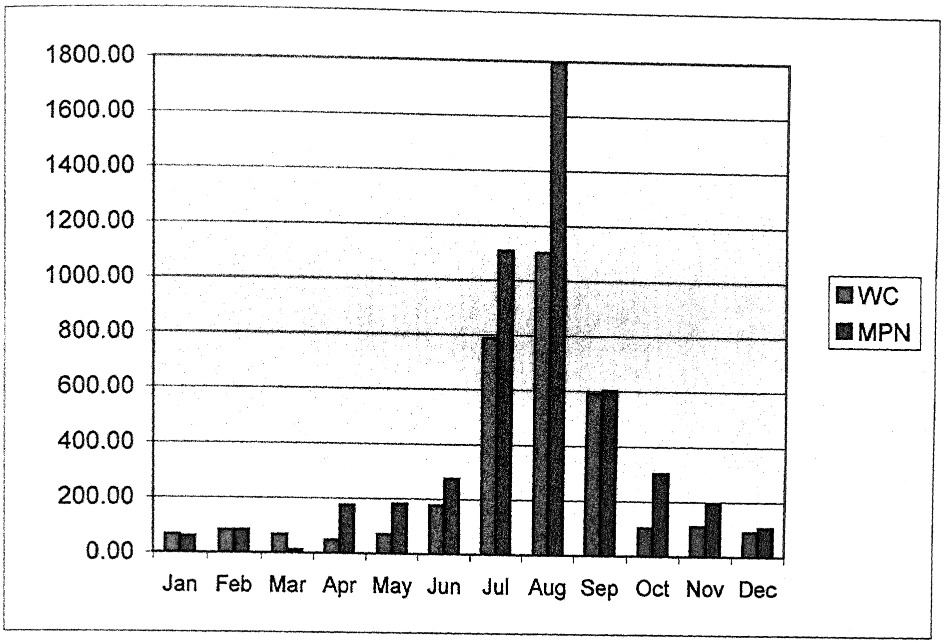


Fig-66

Station P4

Period- 2006

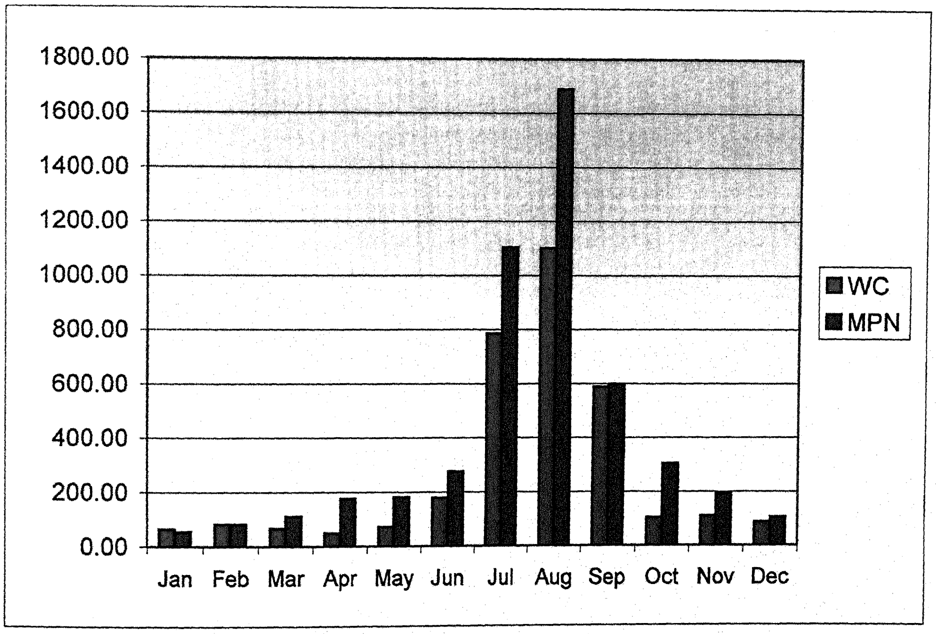


Fig-67

Water Temperature (oC) Turbidity (N.T.U.) Hydrogenion Concontration

Station P5

Period- 2005

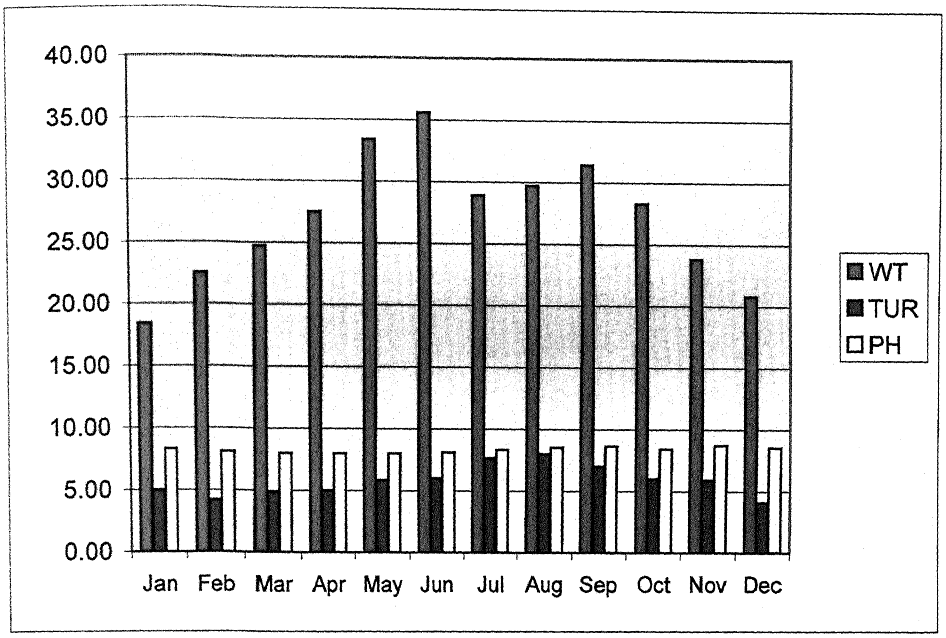


Fig-68

Station P5

Period- 2006

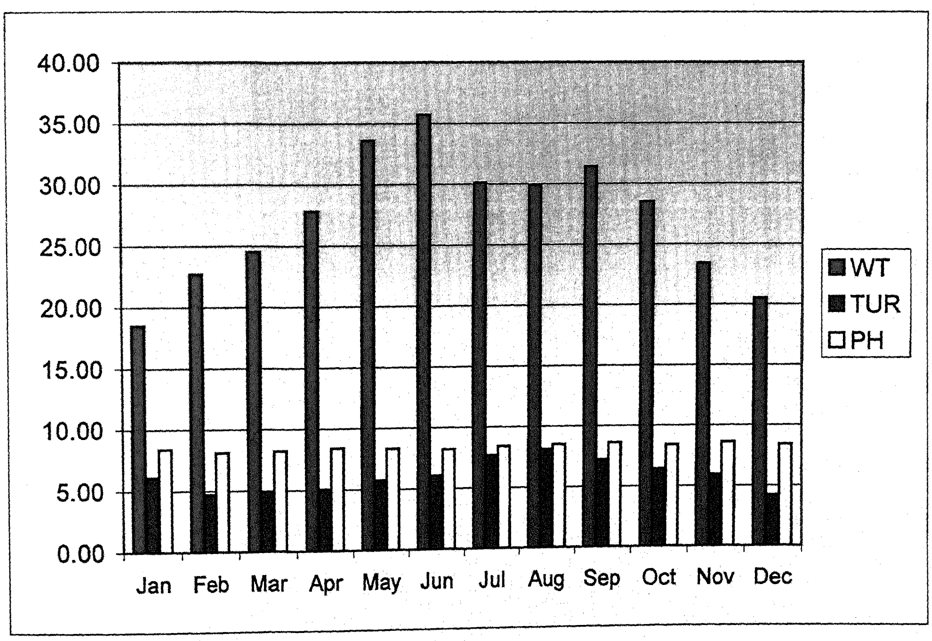


Fig-69

Carbonates (ppm), Bicarbonates (ppm)
Total Alkalinity (ppm)

Station P5

Period- 2005

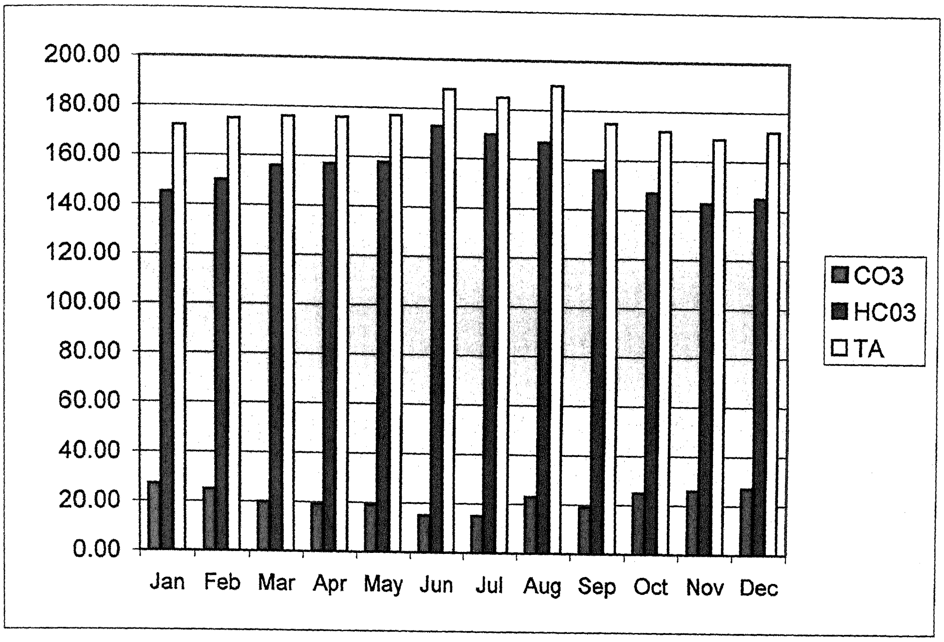


Fig-70

Station P5

Period- 2006

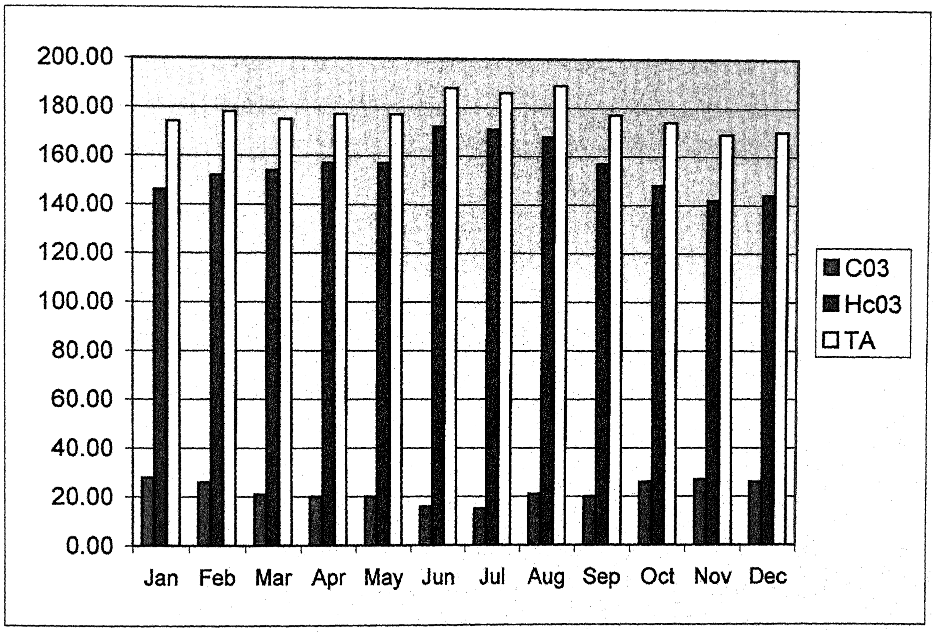


Fig-71

Total Hardndess (ppm) Chloride (ppm)
Dissoloved - oxygen (ppm)

Station P5

Period- 2005

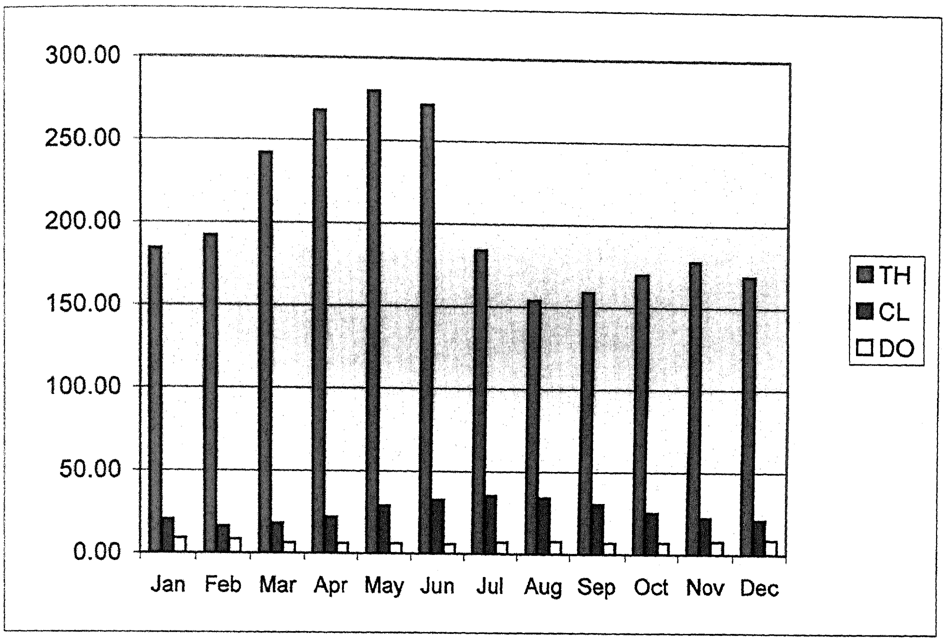


Fig-72

Station P5

Period- 2006

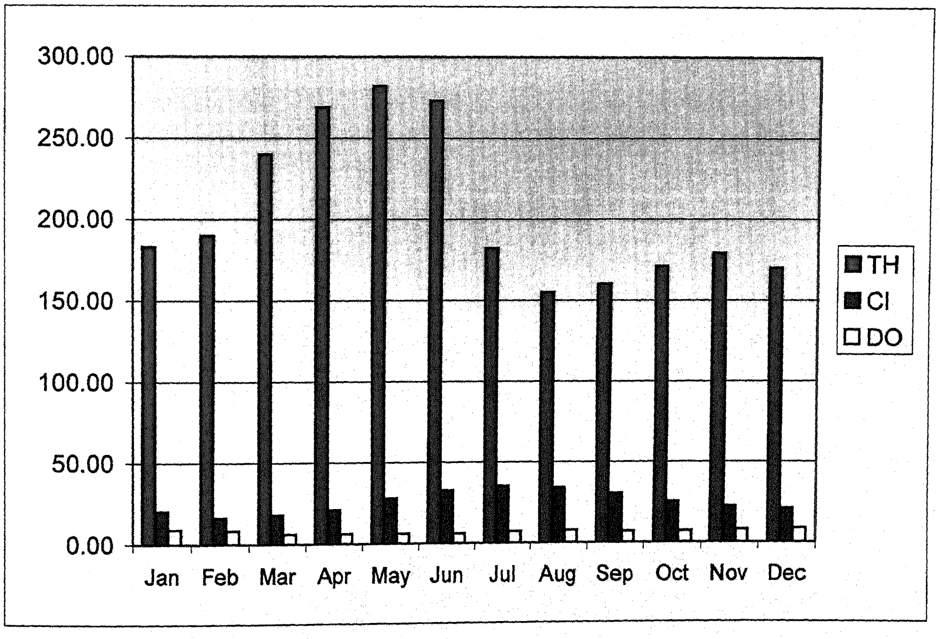


Fig-73

Biochemical oxygen Demand (ppm)
Chemical oxygen Demand (ppm)
Ammonical Nitrogen (ppm)

Station P5

Period- 2005

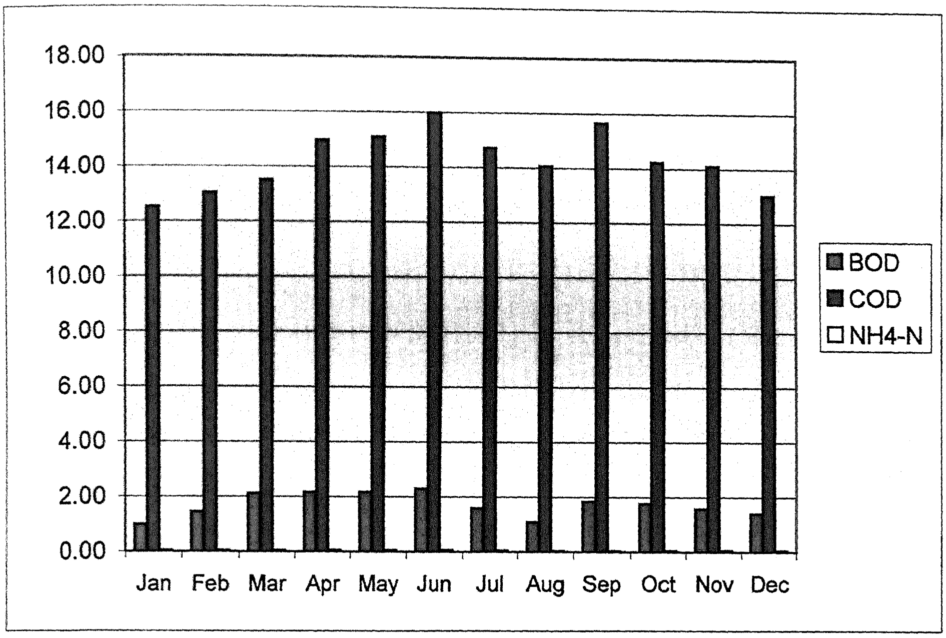


Fig-74

Station P5

Period- 2006

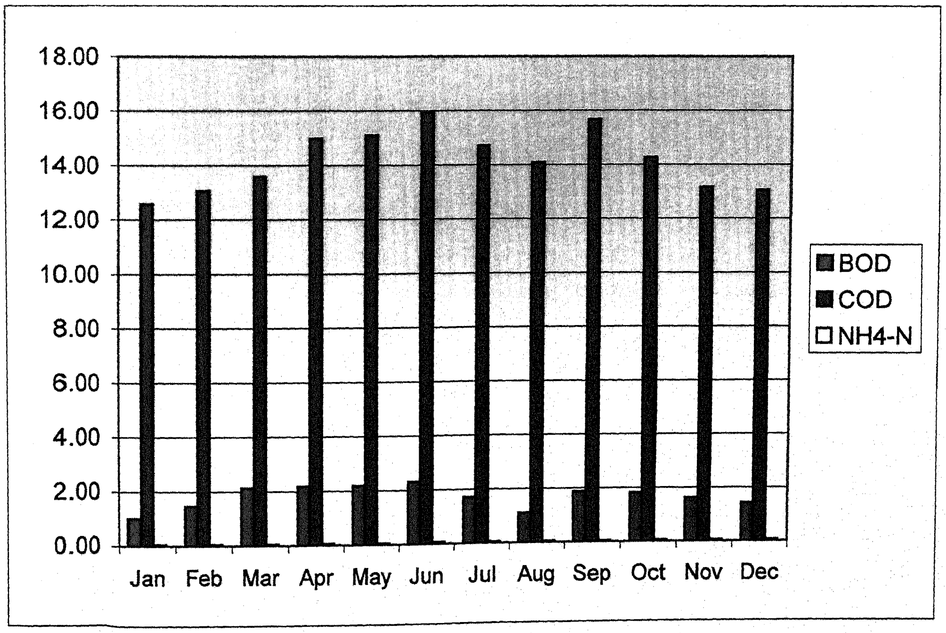


Fig-75

Nitrite (ppm), Nitrate (ppm), Phosphate (ppm)

Station P5

Period- 2005

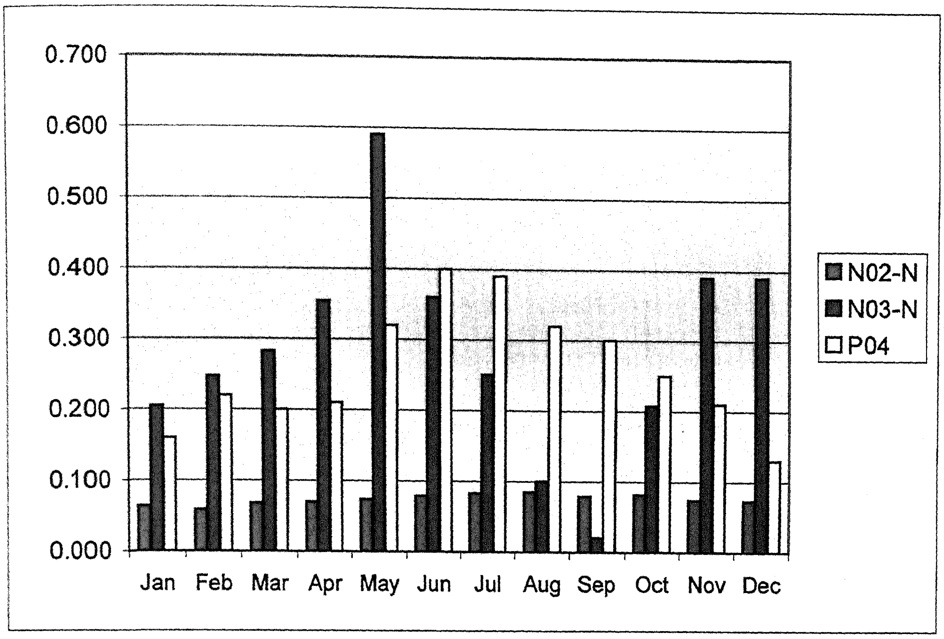


Fig-76

Station P5

Period- 2006

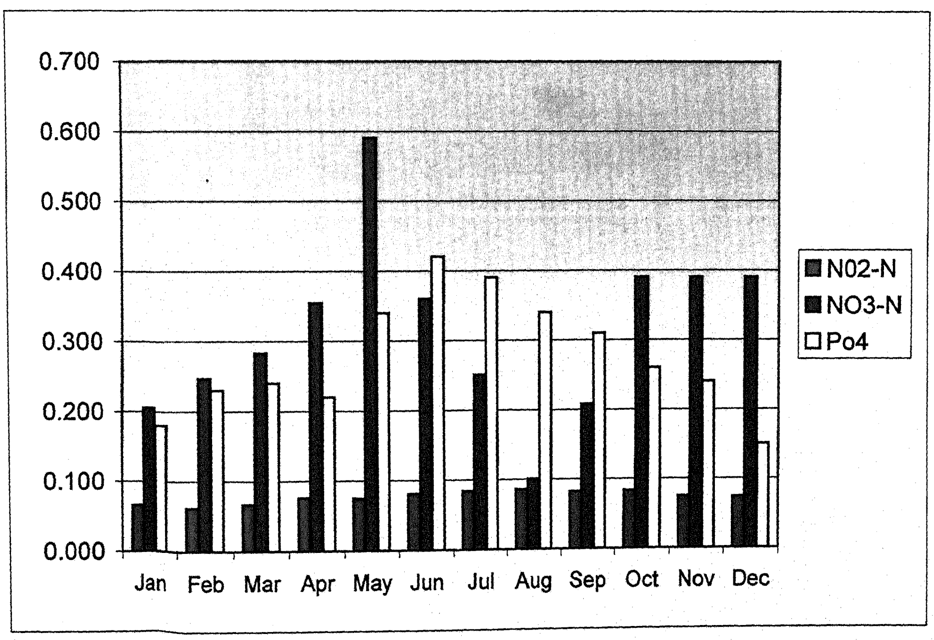


Fig-77

Sulphate (ppm), Sodium (ppm)
Potassium (ppm)

Station P5

Period- 2005

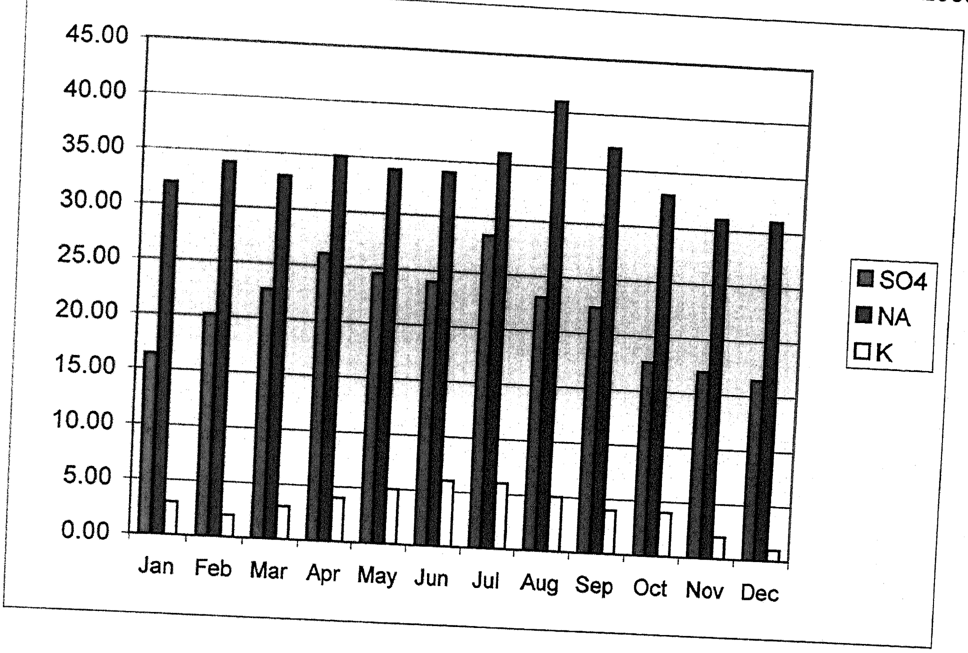


Fig-78

Station P5

Period- 2006

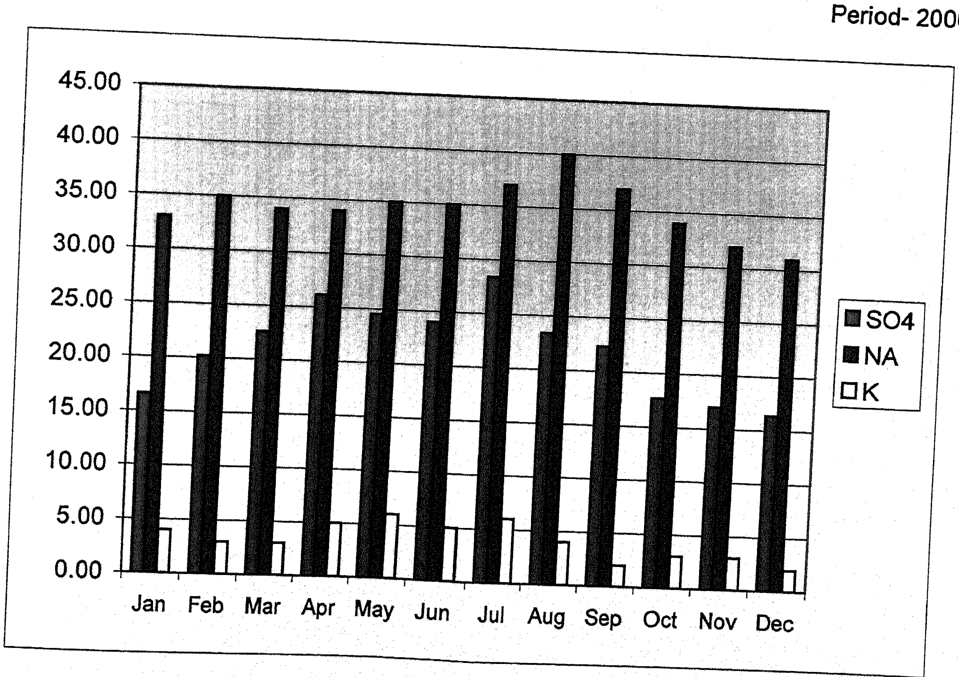


Fig-79

Carbon-di-oxide (ppm), Flouride (ppm)

Station P5

Period- 2005

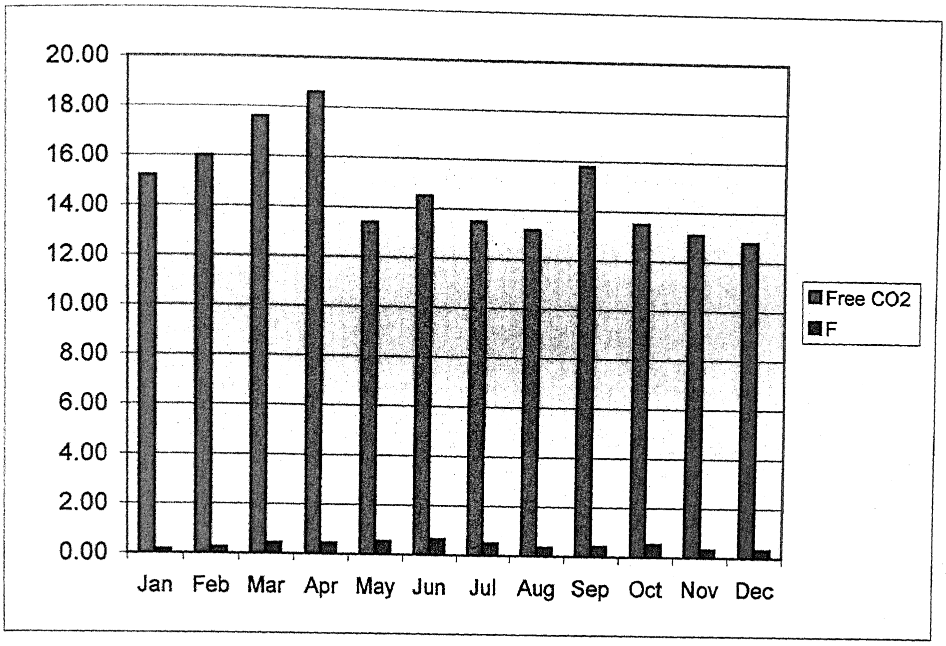


Fig-80

Station P5

Period- 2006

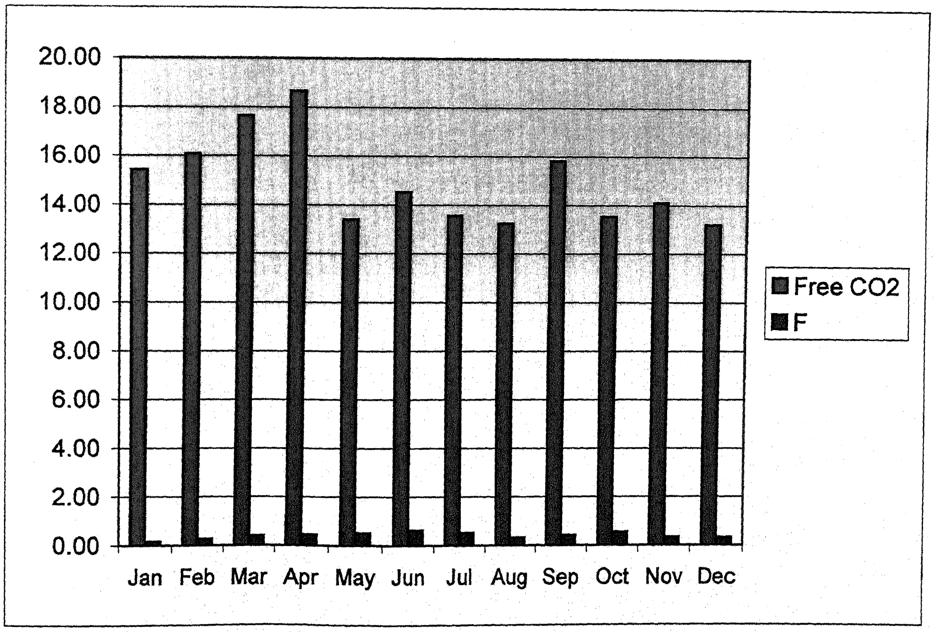


Fig-81

Water Current (Cu/Sec)
Total Coliform (MPN)

Station P5

Period- 2005

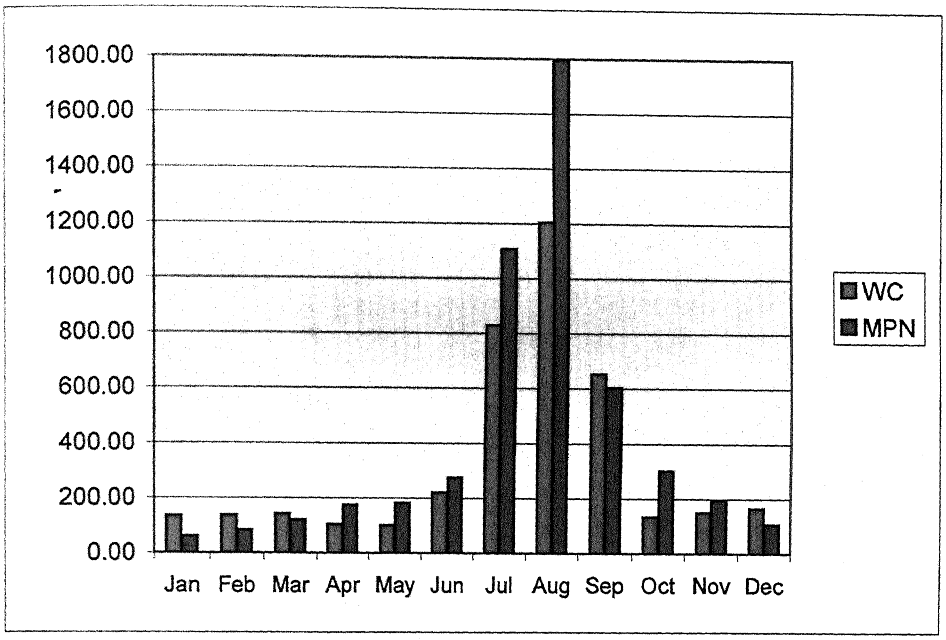


Fig-82

Station P5

Period- 2006

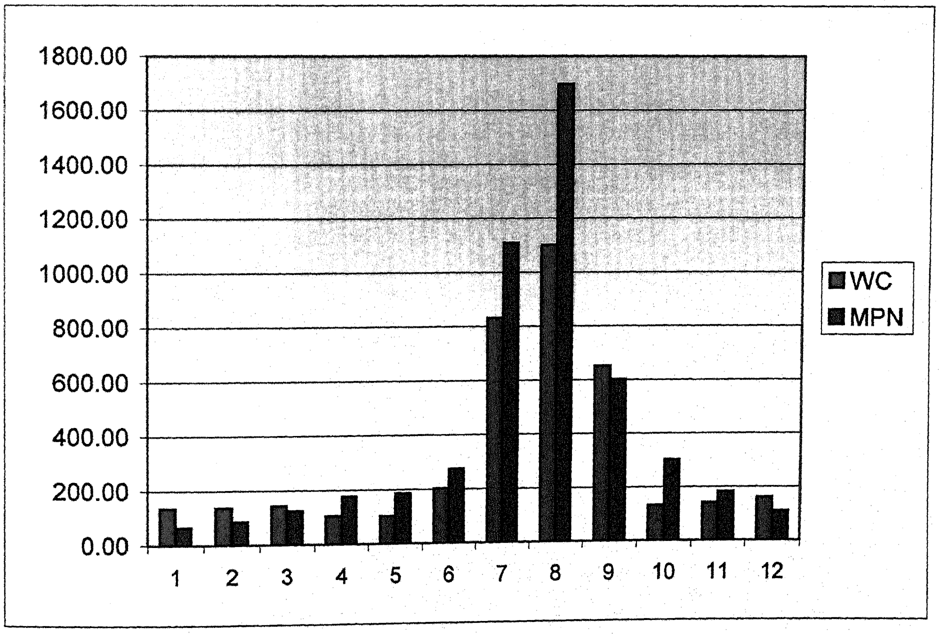


Fig-83

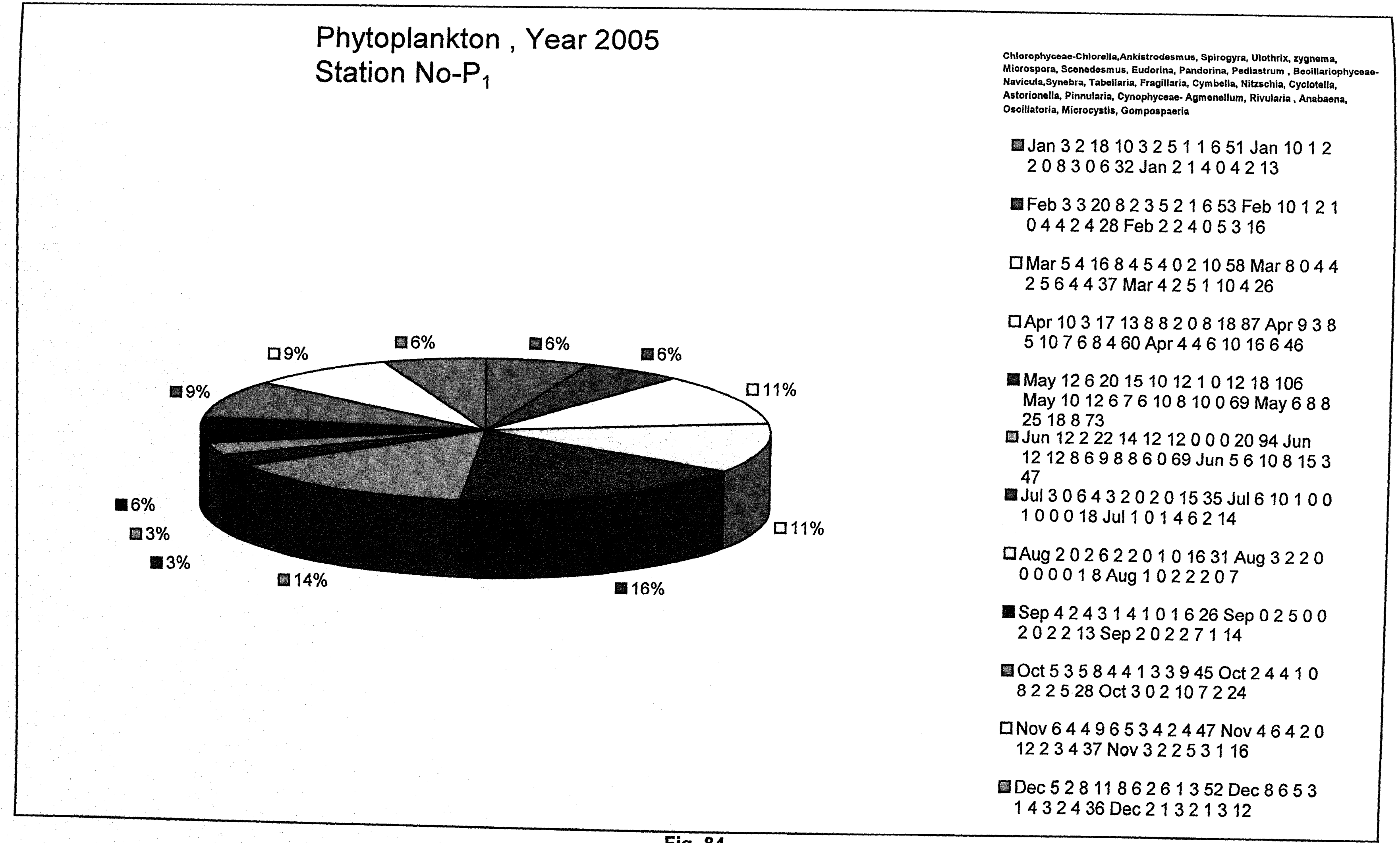

Phytoplankton , Year 2005
Station No-P_1
Chlorophyceae-Chlorella,Ankistrodesmus, Spirogyra, Ulothrix, zygnema, Microspora, Scenedesmus, Eudorina, Pandorina, Pediastrum , Becillariophyceae-Navicula,Synebra, Tabellaria, Fragillaria, Cymbella, Nitzschia, Cyclotella, Astorionella, Pinnularia, Cynophyceae- Agmenellum, Rivularia , Anabaena, Oscillatoria, Microcystis, Gompospaeria
Jan 3 2 18 10 3 2 5 1 1 6 51 Jan 10 1 2 2 0 8 3 0 6 32 Jan 2 1 4 0 4 2 13
Feb 3 3 20 8 2 3 5 2 1 6 53 Feb 10 1 2 1 0 4 4 2 4 28 Feb 2 2 4 0 5 3 16
Mar 5 4 16 8 4 5 4 0 2 10 58 Mar 8 0 4 4 2 5 6 4 4 37 Mar 4 2 5 1 10 4 26
Apr 10 3 17 13 8 8 2 0 8 18 87 Apr 9 3 8 5 10 7 6 8 4 60 Apr 4 4 6 10 16 6 46
May 12 6 20 15 10 12 1 0 12 18 106 May 10 12 6 7 6 10 8 10 0 69 May 6 8 8 25 18 8 73
Jun 12 2 22 14 12 12 0 0 0 20 94 Jun 12 12 8 6 9 8 8 6 0 69 Jun 5 6 10 8 15 3 47
Jul 3 0 6 4 3 2 0 2 0 15 35 Jul 6 10 1 0 0 1 0 0 0 18 Jul 1 0 1 4 6 2 14
Aug 2 0 2 6 2 2 0 1 0 16 31 Aug 3 2 2 0 0 0 0 0 1 8 Aug 1 0 2 2 2 0 7
Sep 4 2 4 3 1 4 1 0 1 6 26 Sep 0 2 5 0 0 2 0 2 2 13 Sep 2 0 2 2 7 1 14
Oct 5 3 5 8 4 4 1 3 3 9 45 Oct 2 4 4 1 0 8 2 2 5 28 Oct 3 0 2 10 7 2 24
Nov 6 4 4 9 6 5 3 4 2 4 47 Nov 4 6 4 2 0 12 2 3 4 37 Nov 3 2 2 5 3 1 16
Dec 5 2 8 11 8 6 2 6 1 3 52 Dec 8 6 5 3 1 4 3 2 4 36 Dec 2 1 3 2 1 3 12
9%
9%
6%
6%
6%
11%
11%
16%
14%
3%
3%
6%

Fig. 84

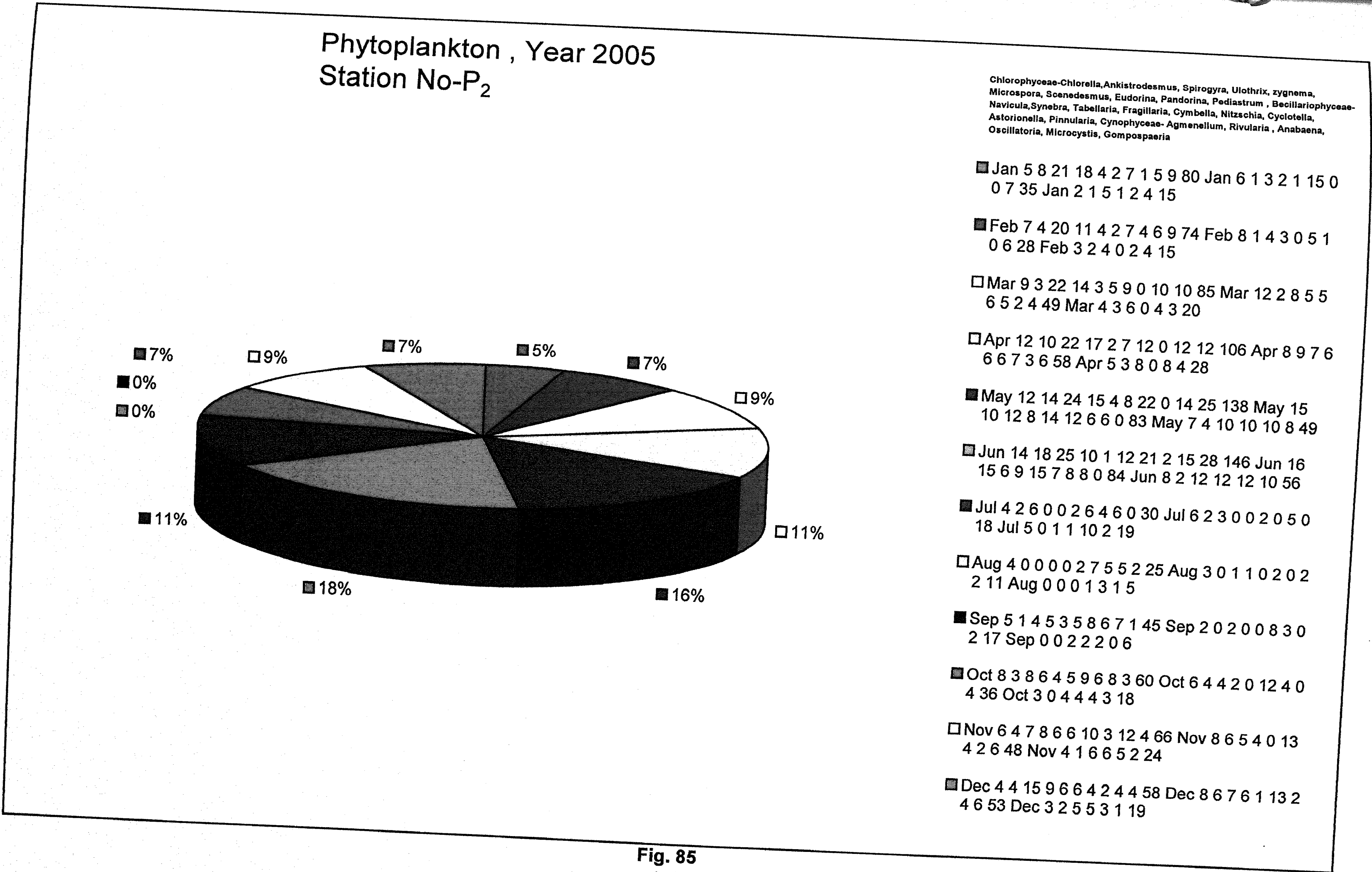

Phytoplankton , Year 2005
Station No-P_2
Chlorophyceae-Chlorella,Ankistrodesmus, Spirogyra, Ulothrix, zygnema, Microspora, Scenedesmus, Eudorina, Pandorina, Pediastrum , Becillariophyceae-Navicula,Synebra, Tabellaria, Fragillaria, Cymbella, Nitzschia, Cyclotella, Astorionella, Pinnularia, Cynophyceae- Agmenellum, Rivularia , Anabaena, Oscillatoria, Microcystis, Gompospaeria
Jan 5 8 21 18 4 2 7 1 5 9 80 Jan 6 1 3 2 1 15 0 0 7 35 Jan 2 1 5 1 2 4 15
Feb 7 4 20 11 4 2 7 4 6 9 74 Feb 8 1 4 3 0 5 1 0 6 28 Feb 3 2 4 0 2 4 15
Mar 9 3 22 14 3 5 9 0 10 10 85 Mar 12 2 8 5 5 6 5 2 4 49 Mar 4 3 6 0 4 3 20
Apr 12 10 22 17 2 7 12 0 12 12 106 Apr 8 9 7 6 6 6 7 3 6 58 Apr 5 3 8 0 8 4 28
May 12 14 24 15 4 8 22 0 14 25 138 May 15 10 12 8 14 12 6 6 0 83 May 7 4 10 10 10 8 49
Jun 14 18 25 10 1 12 21 2 15 28 146 Jun 16 15 6 9 15 7 8 8 0 84 Jun 8 2 12 12 12 10 56
Jul 4 2 6 0 0 2 6 4 6 0 30 Jul 6 2 3 0 0 2 0 5 0 18 Jul 5 0 1 1 10 2 19
Aug 4 0 0 0 0 2 7 5 5 2 25 Aug 3 0 1 1 0 2 0 2 2 11 Aug 0 0 0 1 3 1 5
Sep 5 1 4 5 3 5 8 6 7 1 45 Sep 2 0 2 0 0 8 3 0 2 17 Sep 0 0 2 2 2 0 6
Oct 8 3 8 6 4 5 9 6 8 3 60 Oct 6 4 4 2 0 12 4 0 4 36 Oct 3 0 4 4 4 3 18
Nov 6 4 7 8 6 6 10 3 12 4 66 Nov 8 6 5 4 0 13 4 2 6 48 Nov 4 1 6 6 5 2 24
Dec 4 4 15 9 6 6 4 2 4 4 58 Dec 8 6 7 6 1 13 2 4 6 53 Dec 3 2 5 5 3 1 19
7%
0%
0%
9%
7%
5%
7%
9%
11%
16%
18%
11%

Fig. 85

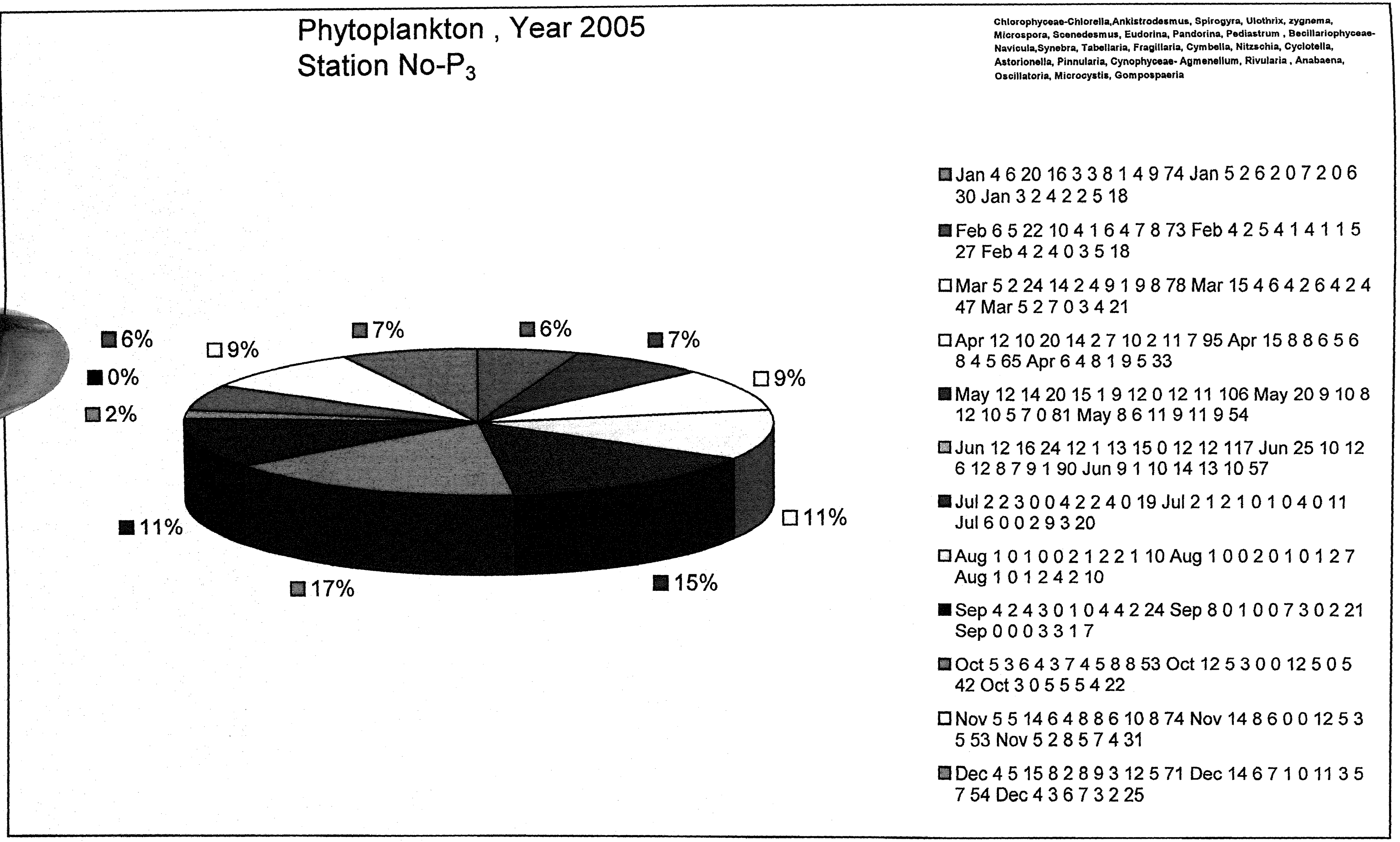

Phytoplankton , Year 2005
Station No-P_3
Chlorophyceae-Chlorella,Ankistrodesmus, Spirogyra, Ulothrix, zygnema, Microspora, Scenedesmus, Eudorina, Pandorina, Pediastrum , Becillariophyceae-Navicula,Synebra, Tabellaria, Fragillaria, Cymbella, Nitzschia, Cyclotella, Astorionella, Pinnularia, Cynophyceae- Agmenellum, Rivularia , Anabaena, Oscillatoria, Microcystis, Gompospaeria
6%
0%
2%
9%
7%
6%
7%
9%
11%
15%
17%
11%
Jan 4 6 20 16 3 3 8 1 4 9 74 Jan 5 2 6 2 0 7 2 0 6 30 Jan 3 2 4 2 2 5 18
Feb 6 5 22 10 4 1 6 4 7 8 73 Feb 4 2 5 4 1 4 1 1 5 27 Feb 4 2 4 0 3 5 18
Mar 5 2 24 14 2 4 9 1 9 8 78 Mar 15 4 6 4 2 6 4 2 4 47 Mar 5 2 7 0 3 4 21
Apr 12 10 20 14 2 7 10 2 11 7 95 Apr 15 8 8 6 5 6 8 4 5 65 Apr 6 4 8 1 9 5 33
May 12 14 20 15 1 9 12 0 12 11 106 May 20 9 10 8 12 10 5 7 0 81 May 8 6 11 9 11 9 54
Jun 12 16 24 12 1 13 15 0 12 12 117 Jun 25 10 12 6 12 8 7 9 1 90 Jun 9 1 10 14 13 10 57
Jul 2 2 3 0 0 4 2 2 4 0 19 Jul 2 1 2 1 0 1 0 4 0 11 Jul 6 0 0 2 9 3 20
Aug 1 0 1 0 0 2 1 2 2 1 10 Aug 1 0 0 2 0 1 0 1 2 7 Aug 1 0 1 2 4 2 10
Sep 4 2 4 3 0 1 0 4 4 2 24 Sep 8 0 1 0 0 7 3 0 2 21 Sep 0 0 0 3 3 1 7
Oct 5 3 6 4 3 7 4 5 8 8 53 Oct 12 5 3 0 0 12 5 0 5 42 Oct 3 0 5 5 5 4 22
Nov 5 5 14 6 4 8 8 6 10 8 74 Nov 14 8 6 0 0 12 5 3 5 53 Nov 5 2 8 5 7 4 31
Dec 4 5 15 8 2 8 9 3 12 5 71 Dec 14 6 7 1 0 11 3 5 7 54 Dec 4 3 6 7 3 2 25

Fig. 86

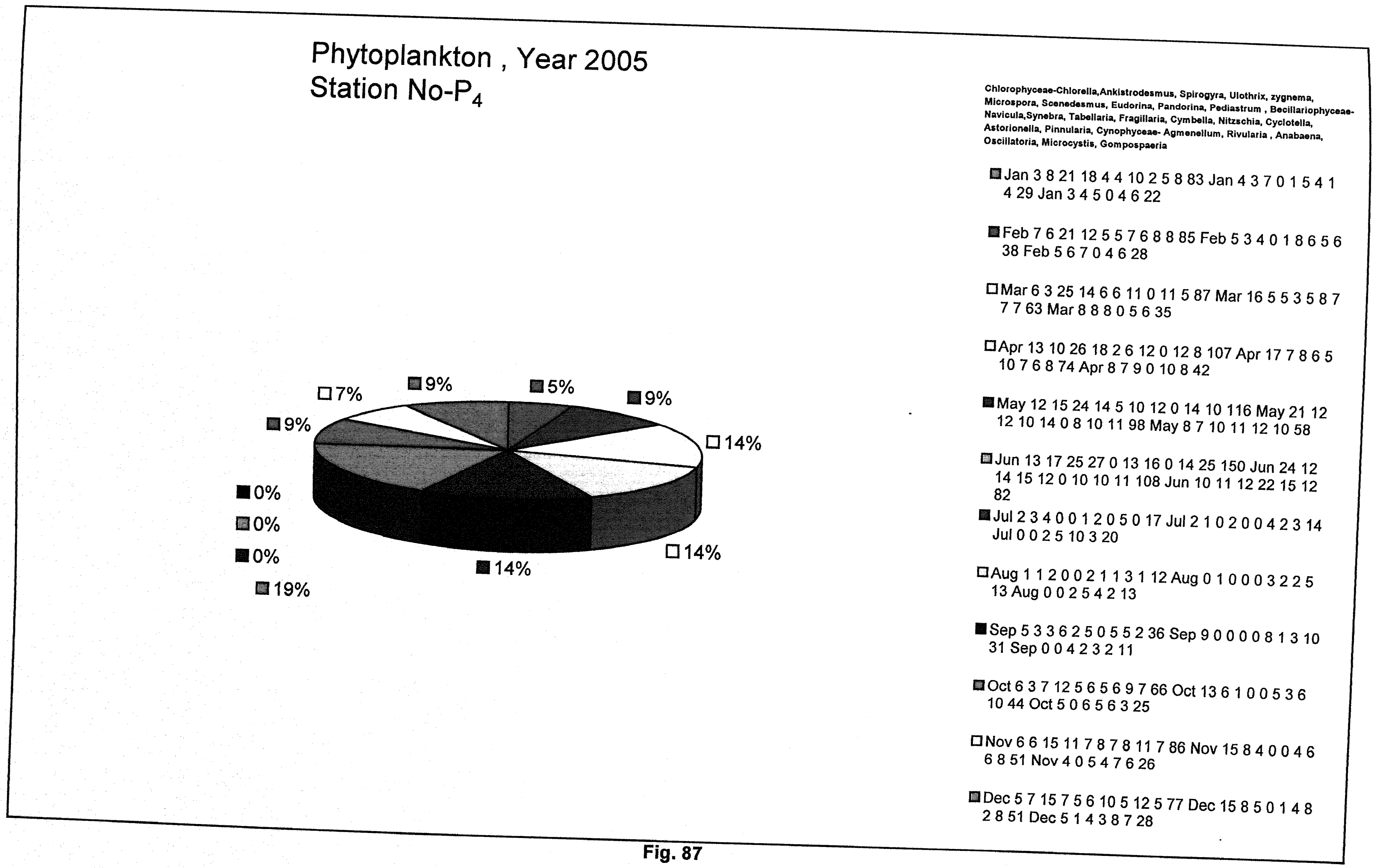
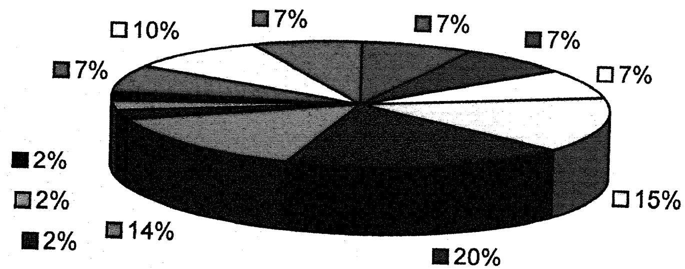

Phytoplankton , Year 2005
Station No-P_4
9%
7%
9%
5%
9%
14%
0%
0%
0%
14%
14%
19%
Chlorophyceae-Chlorella,Ankistrodesmus, Spirogyra, Ulothrix, zygnema, Microspora, Scenedesmus, Eudorina, Pandorina, Pediastrum , Becillariophyceae-Navicula,Synebra, Tabellaria, Fragillaria, Cymbella, Nitzschia, Cyclotella, Astorionella, Pinnularia, Cynophyceae- Agmenellum, Rivularia , Anabaena, Oscillatoria, Microcystis, Gompospaeria
Jan 3 8 21 18 4 4 10 2 5 8 83 Jan 4 3 7 0 1 5 4 1 4 29 Jan 3 4 5 0 4 6 22
Feb 7 6 21 12 5 5 7 6 8 8 85 Feb 5 3 4 0 1 8 6 5 6 38 Feb 5 6 7 0 4 6 28
Mar 6 3 25 14 6 6 11 0 11 5 87 Mar 16 5 5 3 5 8 7 7 7 63 Mar 8 8 8 0 5 6 35
Apr 13 10 26 18 2 6 12 0 12 8 107 Apr 17 7 8 6 5 10 7 6 8 74 Apr 8 7 9 0 10 8 42
May 12 15 24 14 5 10 12 0 14 10 116 May 21 12 12 10 14 0 8 10 11 98 May 8 7 10 11 12 10 58
Jun 13 17 25 27 0 13 16 0 14 25 150 Jun 24 12 14 15 12 0 10 10 11 108 Jun 10 11 12 22 15 12 82
Jul 2 3 4 0 0 1 2 0 5 0 17 Jul 2 1 0 2 0 0 4 2 3 14 Jul 0 0 2 5 10 3 20
Aug 1 1 2 0 0 2 1 1 3 1 12 Aug 0 1 0 0 0 3 2 2 5 13 Aug 0 0 2 5 4 2 13
Sep 5 3 3 6 2 5 0 5 5 2 36 Sep 9 0 0 0 0 8 1 3 10 31 Sep 0 0 4 2 3 2 11
Oct 6 3 7 12 5 6 5 6 9 7 66 Oct 13 6 1 0 0 5 3 6 10 44 Oct 5 0 6 5 6 3 25
Nov 6 6 15 11 7 8 7 8 11 7 86 Nov 15 8 4 0 0 4 6 6 8 51 Nov 4 0 5 4 7 6 26
Dec 5 7 15 7 5 6 10 5 12 5 77 Dec 15 8 5 0 1 4 8 2 8 51 Dec 5 1 4 3 8 7 28

Fig. 87

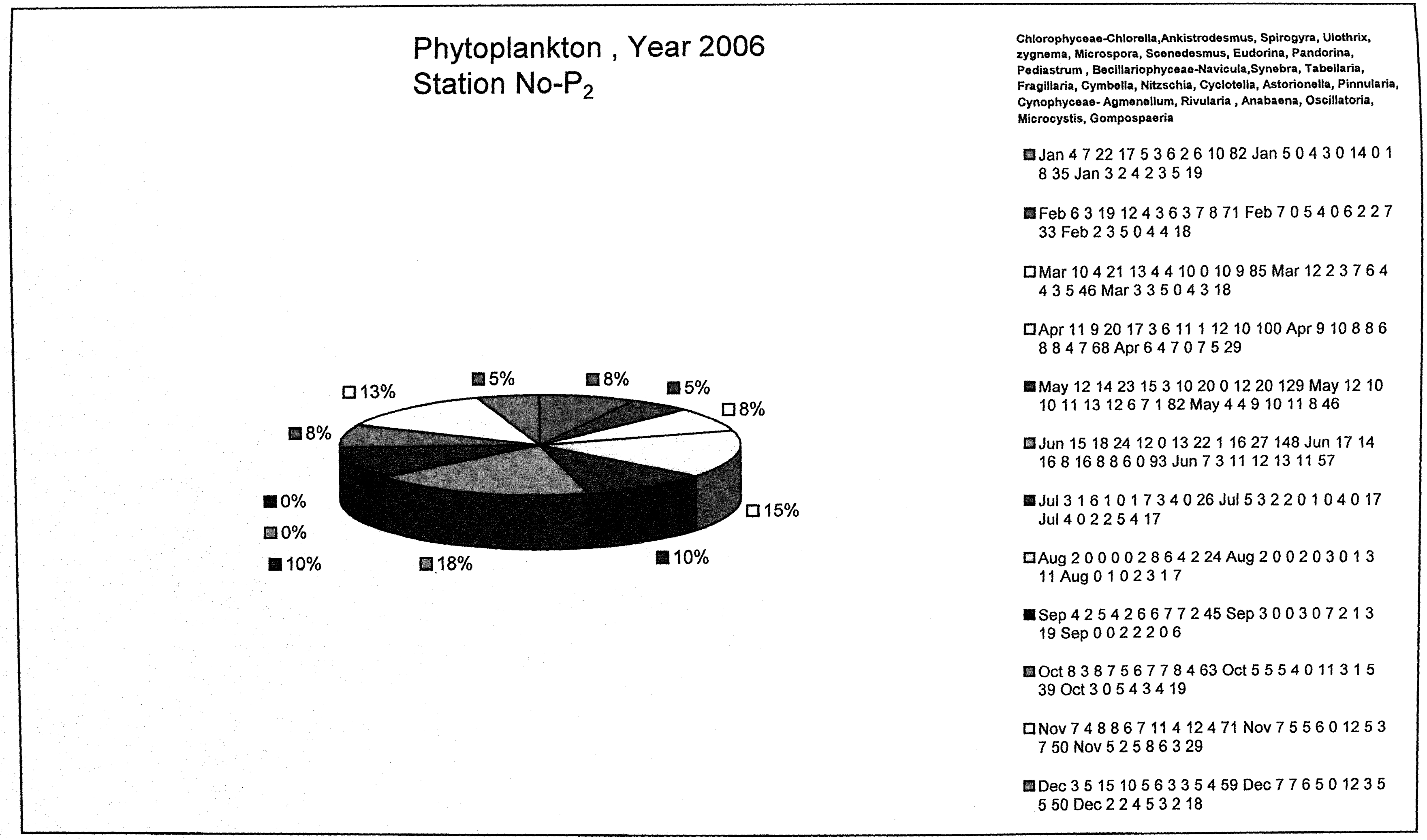
Phytoplankton , Year 2006
Station No-P_1



Chlorophyceae-Chlorella,Ankistrodesmus, Spirogyra, Ulothrix, zygnema, Microspora, Scenedesmus, Eudorina, Pandorina, Pediastrum , Becillariophyceae-Navicula,Synebra, Tabellaria, Fragillaria, Cymbella, Nitzschia, Cyclotella, Astorionella, Pinnularia, Cynophyceae- Agmenellum, Rivularia , Anabaena, Oscillatoria, Microcystis, Gompospaeria

- Jan 4 2 16 11 4 2 5 2 1 5 52 Jan 10 2 2 3 1 9 3 0 7 37 Jan 3 2 3 0 4 2 14
- Feb 3 3 20 9 3 3 5 3 1 5 55 Feb 10 2 2 2 0 5 4 1 3 29 Feb 3 4 3 0 4 4 18
- Mar 6 5 15 8 5 6 6 1 3 10 65 Mar 9 0 4 3 1 5 6 3 3 34 Mar 3 4 4 2 9 5 27
- Apr 10 4 17 12 8 8 5 0 7 17 88 Apr 9 4 9 6 9 8 5 7 4 61 Apr 6 7 5 10 18 8 54
- May 13 6 19 14 8 12 1 0 10 18 101 May 11 12 7 7 8 10 7 8 0 70 May 8 10 7 20 16 7 68
- Jun 14 3 22 15 10 13 1 0 0 20 98 Jun 12 13 9 6 10 9 10 8 1 78 Jun 6 8 9 7 16 2 48
- Jul 2 0 4 3 2 1 0 1 0 16 29 Jul 6 10 0 0 1 0 0 1 0 18 Jul 1 0 0 4 6 2 13
- Aug 1 0 2 5 0 1 0 2 1 16 28 Aug 4 3 1 1 1 0 0 1 1 12 Aug 1 1 2 2 2 1 9
- Sep 4 2 4 3 1 4 2 0 2 7 29 Sep 0 1 4 0 0 3 0 1 2 11 Sep 1 1 2 3 6 5 18
- Oct 5 3 6 7 4 5 1 5 4 10 50 Oct 1 3 3 2 0 9 1 2 4 25 Oct 3 1 1 9 8 1 23
- Nov 6 5 5 8 6 6 3 5 3 4 51 Nov 5 6 5 3 0 11 3 3 3 39 Nov 4 3 1 6 4 2 20
- Dec 4 3 8 10 7 5 3 4 2 4 50 Dec 7 5 6 4 0 3 4 4 3 36 Dec 3 2 3 3 2 4 17

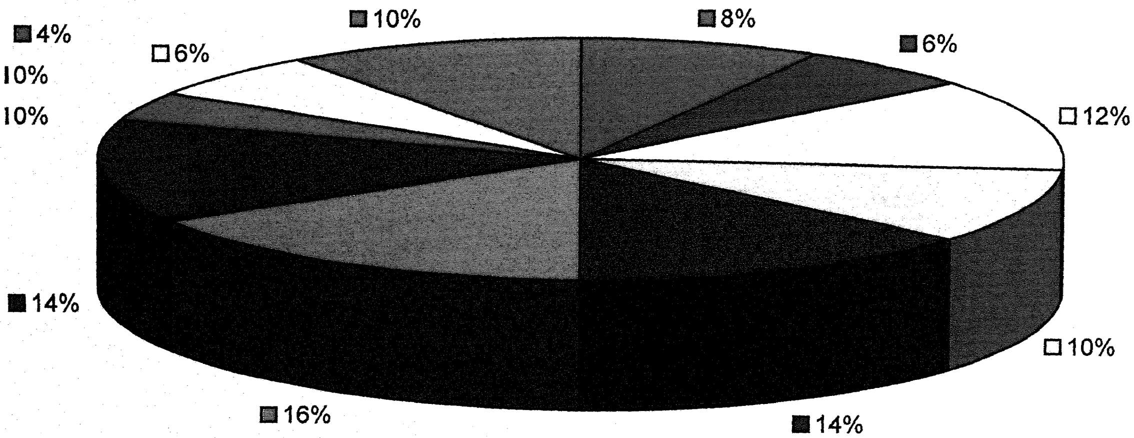
Fig. 89



Phytoplankton , Year 2006
Station No-P2
13%
5%
8%
5%
8%
8%
15%
0%
0%
10%
18%
10%
Chlorophyceae-Chlorella,Ankistrodesmus, Spirogyra, Ulothrix, zygnema, Microspora, Scenedesmus, Eudorina, Pandorina, Pediastrum , Becillariophyceae-Navicula,Synebra, Tabellaria, Fragillaria, Cymbella, Nitzschia, Cyclotella, Astorionella, Pinnularia, Cynophyceae- Agmenellum, Rivularia , Anabaena, Oscillatoria, Microcystis, Gompospaeria
Jan 4 7 22 17 5 3 6 2 6 10 82 Jan 5 0 4 3 0 14 0 1 8 35 Jan 3 2 4 2 3 5 19
Feb 6 3 19 12 4 3 6 3 7 8 71 Feb 7 0 5 4 0 6 2 2 7 33 Feb 2 3 5 0 4 4 18
Mar 10 4 21 13 4 4 10 0 10 9 85 Mar 12 2 3 7 6 4 4 3 5 46 Mar 3 3 5 0 4 3 18
Apr 11 9 20 17 3 6 11 1 12 10 100 Apr 9 10 8 8 6 8 8 4 7 68 Apr 6 4 7 0 7 5 29
May 12 14 23 15 3 10 20 0 12 20 129 May 12 10 10 11 13 12 6 7 1 82 May 4 4 9 10 11 8 46
Jun 15 18 24 12 0 13 22 1 16 27 148 Jun 17 14 16 8 16 8 8 6 0 93 Jun 7 3 11 12 13 11 57
Jul 3 1 6 1 0 1 7 3 4 0 26 Jul 5 3 2 2 0 1 0 4 0 17 Jul 4 0 2 2 5 4 17
Aug 2 0 0 0 0 2 8 6 4 2 24 Aug 2 0 0 2 0 3 0 1 3 11 Aug 0 1 0 2 3 1 7
Sep 4 2 5 4 2 6 6 7 7 2 45 Sep 3 0 0 3 0 7 2 1 3 19 Sep 0 0 2 2 2 0 6
Oct 8 3 8 7 5 6 7 7 8 4 63 Oct 5 5 5 4 0 11 3 1 5 39 Oct 3 0 5 4 3 4 19
Nov 7 4 8 8 6 7 11 4 12 4 71 Nov 7 5 5 6 0 12 5 3 7 50 Nov 5 2 5 8 6 3 29
Dec 3 5 15 10 5 6 3 3 5 4 59 Dec 7 7 6 5 0 12 3 5 5 50 Dec 2 2 4 5 3 2 18

Fig. 90

Phytoplankton , Year 2006
Station No-P_3



Chlorophyceae-Chlorella,Ankistrodesmus, Spirogyra, Ulothrix, zygnema, Microspora, Scenedesmus, Eudorina, Pandorina, Pediastrum , Becillariophyceae-Navicula,Synebra, Tabellaria, Fragillaria, Cymbella, Nitzschia, Cyclotella, Astorionella, Pinnularia, Cynophyceae- Agmenellum, Rivularia , Anabaena, Oscillatoria, Microcystis, Gompospaeria

Jan 5 5 21 17 4 3 7 2 3 8 75 Jan 4 3 7 3 0 6 2 0 5 30 Jan 4 1 3 3 1 4 16

Feb 6 4 21 11 3 2 5 3 7 6 68 Feb 5 1 4 3 0 4 0 1 4 22 Feb 3 3 5 0 2 4 17

Mar 6 3 23 13 3 5 8 0 7 7 75 Mar 12 6 7 3 2 5 5 3 6 49 Mar 6 2 6 0 4 4 22

Apr 14 11 21 15 3 8 9 3 10 6 100 Apr 13 9 7 5 4 4 4 6 0 52 Apr 5 3 7 0 8 5 28

May 12 15 20 16 10 12 11 0 13 8 117 May 18 8 9 8 13 10 8 8 3 85 May 7 7 10 8 10 8 50

Jun 13 13 22 14 13 16 13 1 12 10 127 Jun 23 11 11 7 11 9 0 5 1 78 Jun 8 0 9 15 12 10 54

Jul 1 1 2 0 3 2 1 1 3 0 14 Jul 1 0 3 1 0 0 2 2 3 12 Jul 7 0 1 1 8 2 19

Aug 0 0 2 0 2 2 1 2 3 1 13 Aug 1 0 0 0 1 0 2 2 0 6 Aug 0 0 1 2 3 1 7

Sep 3 2 3 4 0 0 0 3 3 1 19 Sep 5 2 2 0 0 6 4 0 6 25 Sep 0 0 0 2 3 2 7

Oct 6 4 5 3 4 8 5 5 7 6 53 Oct 13 6 2 0 0 11 5 2 4 43 Oct 2 0 4 5 4 3 18

Nov 6 5 12 7 3 7 7 8 9 8 72 Nov 13 8 5 0 0 12 5 4 4 51 Nov 3 2 7 4 8 3 27

Dec 5 5 14 6 3 6 6 2 10 6 63 Dec 12 7 6 0 0 10 4 2 4 45 Dec 5 3 5 6 2 2 23

Fig. 91

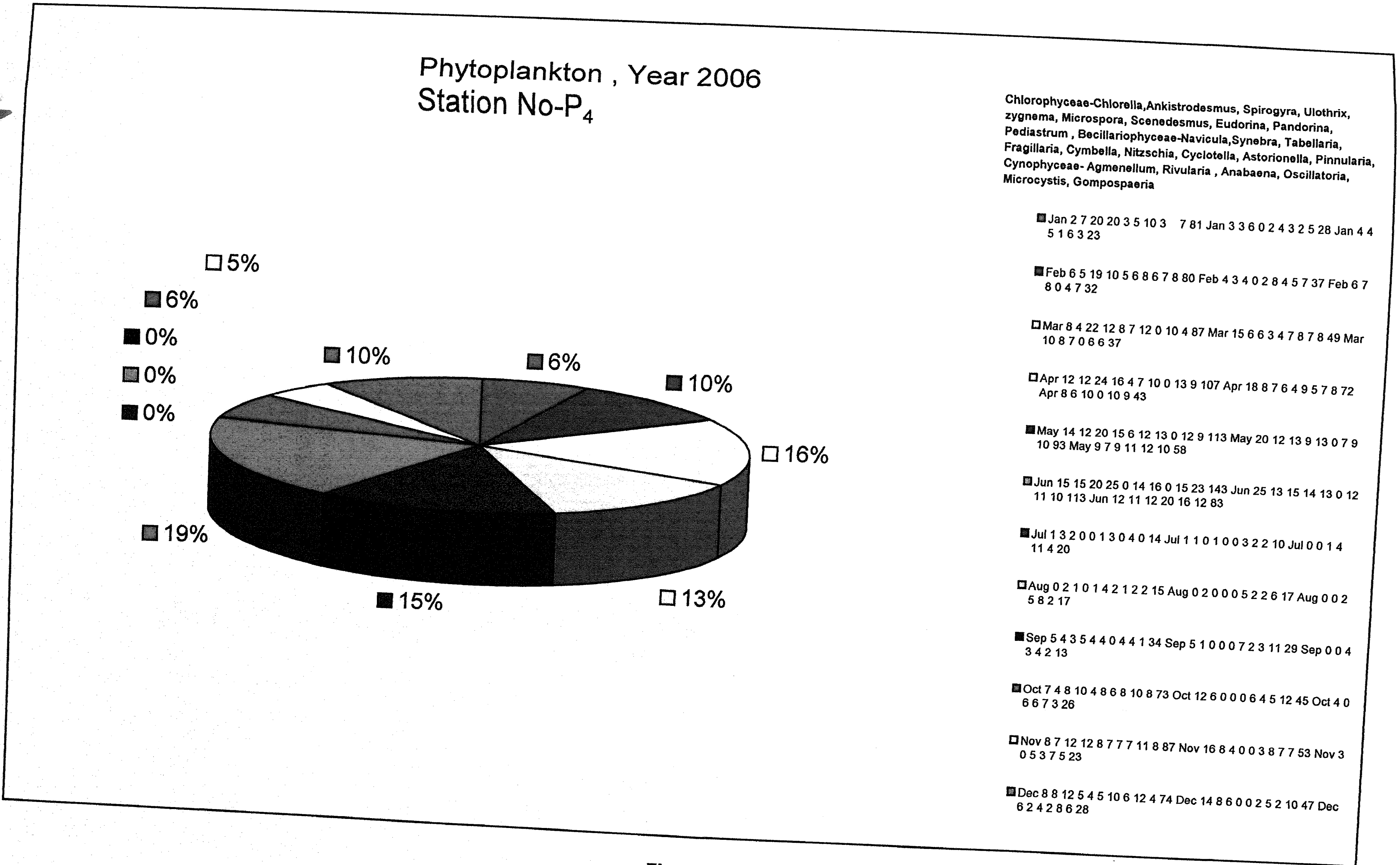

Phytoplankton , Year 2006
Station No-P4
5%
6%
0%
0%
0%
10%
6%
10%
16%
19%
15%
13%
Chlorophyceae-Chlorella,Ankistrodesmus, Spirogyra, Ulothrix, zygnema, Microspora, Scenedesmus, Eudorina, Pandorina, Pediastrum , Becillariophyceae-Navicula,Synebra, Tabellaria, Fragillaria, Cymbella, Nitzschia, Cyclotella, Astorionella, Pinnularia, Cynophyceae- Agmenellum, Rivularia , Anabaena, Oscillatoria, Microcystis, Gompospaeria
Jan 2 7 20 20 3 5 10 3 7 81 Jan 3 3 6 0 2 4 3 2 5 28 Jan 4 4 5 1 6 3 23
Feb 6 5 19 10 5 6 8 6 7 8 80 Feb 4 3 4 0 2 8 4 5 7 37 Feb 6 7 8 0 4 7 32
Mar 8 4 22 12 8 7 12 0 10 4 87 Mar 15 6 6 3 4 7 8 7 8 49 Mar 10 8 7 0 6 6 37
Apr 12 12 24 16 4 7 10 0 13 9 107 Apr 18 8 7 6 4 9 5 7 8 72 Apr 8 6 10 0 10 9 43
May 14 12 20 15 6 12 13 0 12 9 113 May 20 12 13 9 13 0 7 9 10 93 May 9 7 9 11 12 10 58
Jun 15 15 20 25 0 14 16 0 15 23 143 Jun 25 13 15 14 13 0 12 11 10 113 Jun 12 11 12 20 16 12 83
Jul 1 3 2 0 0 1 3 0 4 0 14 Jul 1 1 0 1 0 0 3 2 2 10 Jul 0 0 1 4 11 4 20
Aug 0 2 1 0 1 4 2 1 2 2 15 Aug 0 2 0 0 0 5 2 2 6 17 Aug 0 0 2 5 8 2 17
Sep 5 4 3 5 4 4 0 4 4 1 34 Sep 5 1 0 0 0 7 2 3 11 29 Sep 0 0 4 3 4 2 13
Oct 7 4 8 10 4 8 6 8 10 8 73 Oct 12 6 0 0 0 6 4 5 12 45 Oct 4 0 6 6 7 3 26
Nov 8 7 12 12 8 7 7 7 11 8 87 Nov 16 8 4 0 0 3 8 7 7 53 Nov 3 0 5 3 7 5 23
Dec 8 8 12 5 4 5 10 6 12 4 74 Dec 14 8 6 0 0 2 5 2 10 47 Dec 6 2 4 2 8 6 28

Fig. 92

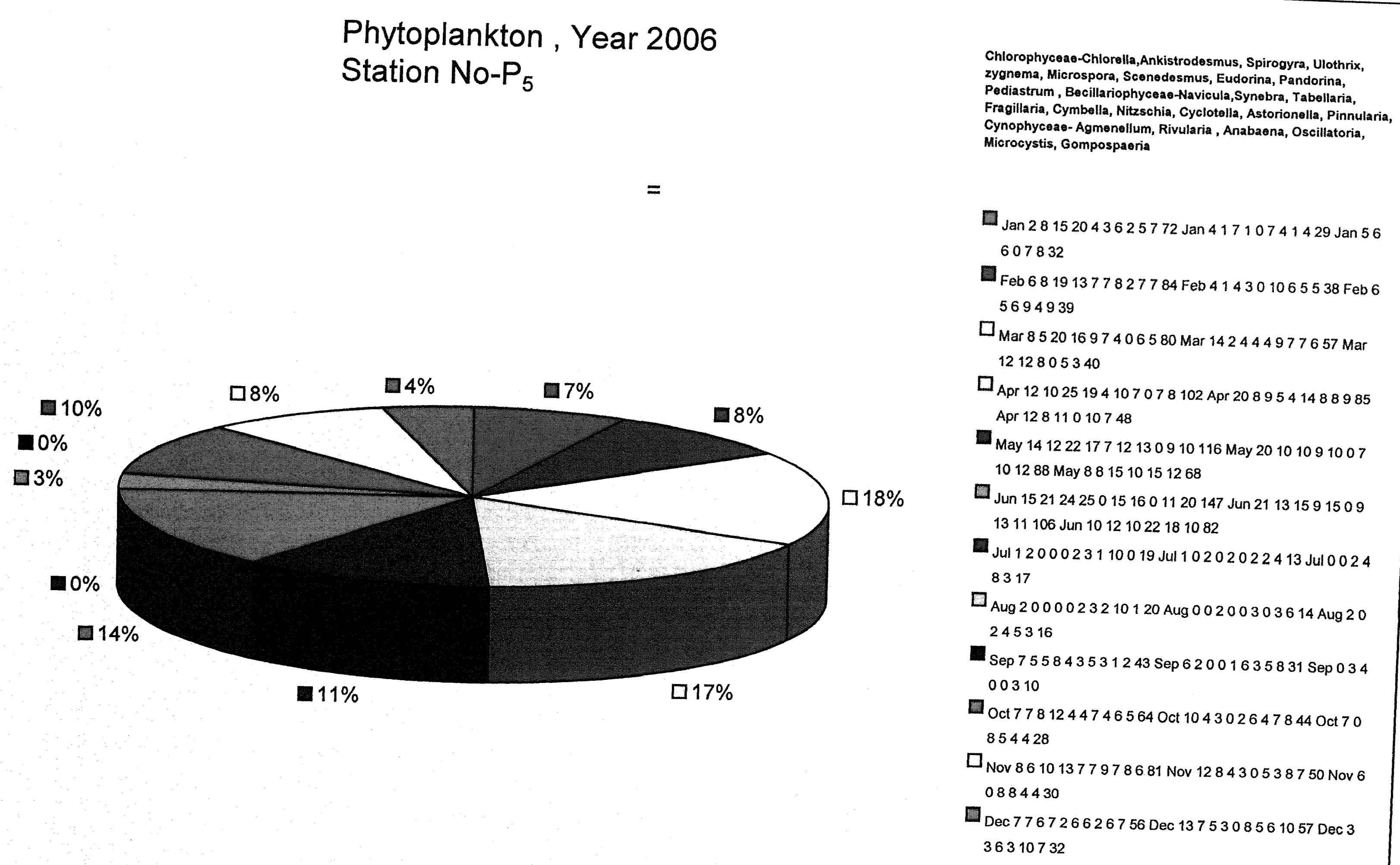
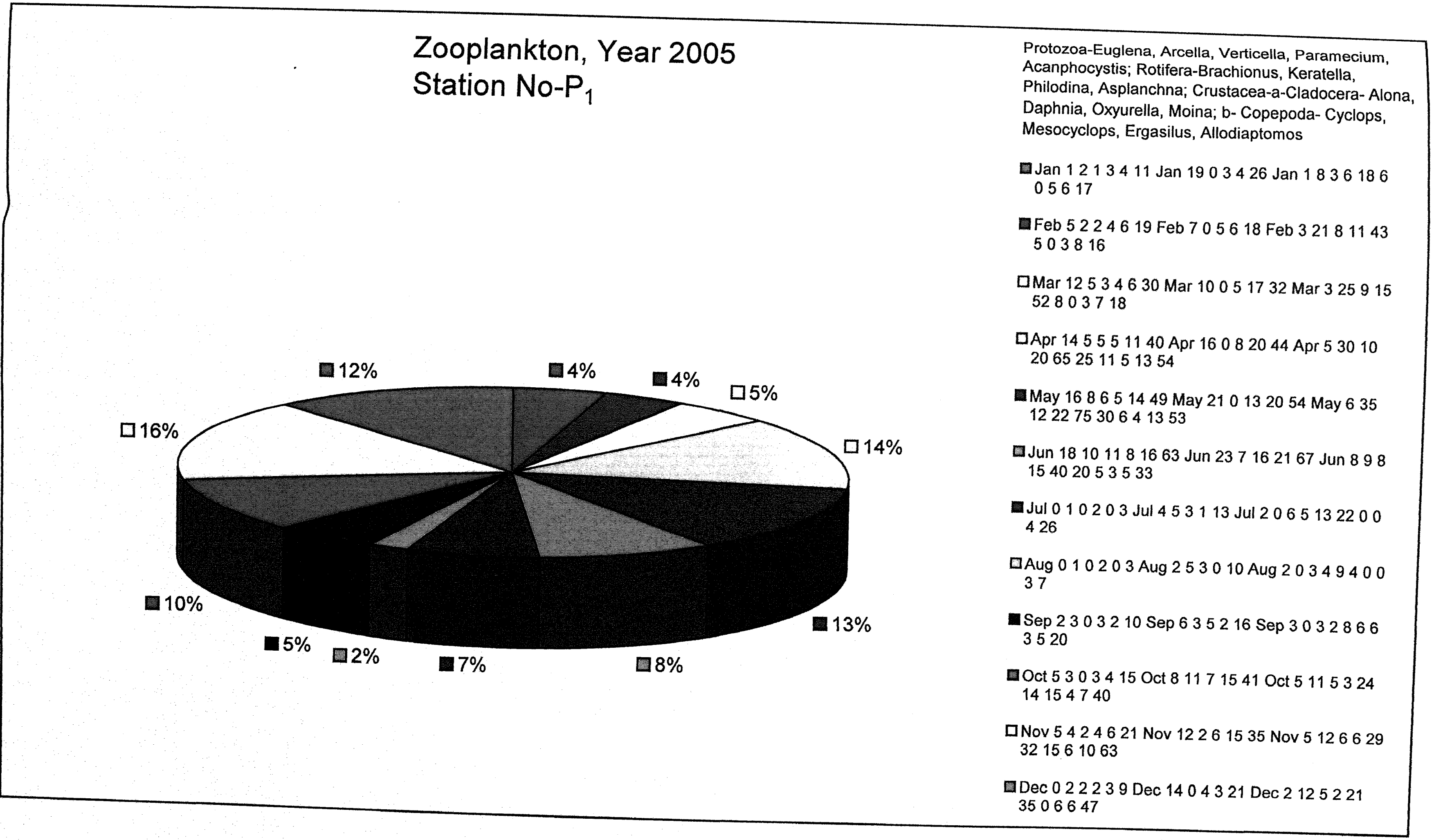

Phytoplankton , Year 2006
Station No-P5
Chlorophyceae-Chlorella,Ankistrodesmus, Spirogyra, Ulothrix, zygnema, Microspora, Scenedesmus, Eudorina, Pandorina, Pediastrum , Becillariophyceae-Navicula,Synebra, Tabellaria, Fragillaria, Cymbella, Nitzschia, Cyclotella, Astorionella, Pinnularia, Cynophyceae- Agmenellum, Rivularia , Anabaena, Oscillatoria, Microcystis, Gompospaeria
=
Jan 2 8 15 20 4 3 6 2 5 7 72 Jan 4 1 7 1 0 7 4 1 4 29 Jan 5 6 6 0 7 8 32
Feb 6 8 19 13 7 7 8 2 7 7 84 Feb 4 1 4 3 0 10 6 5 5 38 Feb 6 5 6 9 4 9 39
Mar 8 5 20 16 9 7 4 0 6 5 80 Mar 14 2 4 4 4 9 7 7 6 57 Mar 12 12 8 0 5 3 40
Apr 12 10 25 19 4 10 7 0 7 8 102 Apr 20 8 9 5 4 14 8 8 9 85 Apr 12 8 11 0 10 7 48
May 14 12 22 17 7 12 13 0 9 10 116 May 20 10 10 9 10 0 7 10 12 88 May 8 8 15 10 15 12 68
Jun 15 21 24 25 0 15 16 0 11 20 147 Jun 21 13 15 9 15 0 9 13 11 106 Jun 10 12 10 22 18 10 82
Jul 1 2 0 0 0 2 3 1 10 0 19 Jul 1 0 2 0 2 0 2 2 4 13 Jul 0 0 2 4 8 3 17
Aug 2 0 0 0 0 2 3 2 10 1 20 Aug 0 0 2 0 0 3 0 3 6 14 Aug 2 0 2 4 5 3 16
Sep 7 5 5 8 4 3 5 3 1 2 43 Sep 6 2 0 0 1 6 3 5 8 31 Sep 0 3 4 0 0 3 10
Oct 7 7 8 12 4 4 7 4 6 5 64 Oct 10 4 3 0 2 6 4 7 8 44 Oct 7 0 8 5 4 4 28
Nov 8 6 10 13 7 7 9 7 8 6 81 Nov 12 8 4 3 0 5 3 8 7 50 Nov 6 0 8 8 4 4 30
Dec 7 7 6 7 2 6 6 2 6 7 56 Dec 13 7 5 3 0 8 5 6 10 57 Dec 3 3 6 3 10 7 32
10%
0%
3%
8%
4%
7%
8%
18%
17%
11%
14%
0%

Fig. 93



Zooplankton, Year 2005
Station No-P1
12%
4%
4%
5%
16%
14%
10%
13%
5%
2%
7%
8%
Protozoa-Euglena, Arcella, Verticella, Paramecium, Acanphocystis; Rotifera-Brachionus, Keratella, Philodina, Asplanchna; Crustacea-a-Cladocera- Alona, Daphnia, Oxyurella, Moina; b- Copepoda- Cyclops, Mesocyclops, Ergasilus, Allodiaptomos
Jan 1 2 1 3 4 11 Jan 19 0 3 4 26 Jan 1 8 3 6 18 6 0 5 6 17
Feb 5 2 2 4 6 19 Feb 7 0 5 6 18 Feb 3 21 8 11 43 5 0 3 8 16
Mar 12 5 3 4 6 30 Mar 10 0 5 17 32 Mar 3 25 9 15 52 8 0 3 7 18
Apr 14 5 5 5 11 40 Apr 16 0 8 20 44 Apr 5 30 10 20 65 25 11 5 13 54
May 16 8 6 5 14 49 May 21 0 13 20 54 May 6 35 12 22 75 30 6 4 13 53
Jun 18 10 11 8 16 63 Jun 23 7 16 21 67 Jun 8 9 8 15 40 20 5 3 5 33
Jul 0 1 0 2 0 3 Jul 4 5 3 1 13 Jul 2 0 6 5 13 22 0 0 4 26
Aug 0 1 0 2 0 3 Aug 2 5 3 0 10 Aug 2 0 3 4 9 4 0 0 3 7
Sep 2 3 0 3 2 10 Sep 6 3 5 2 16 Sep 3 0 3 2 8 6 6 3 5 20
Oct 5 3 0 3 4 15 Oct 8 11 7 15 41 Oct 5 11 5 3 24 14 15 4 7 40
Nov 5 4 2 4 6 21 Nov 12 2 6 15 35 Nov 5 12 6 6 29 32 15 6 10 63
Dec 0 2 2 2 3 9 Dec 14 0 4 3 21 Dec 2 12 5 2 21 35 0 6 6 47

Fig. 94

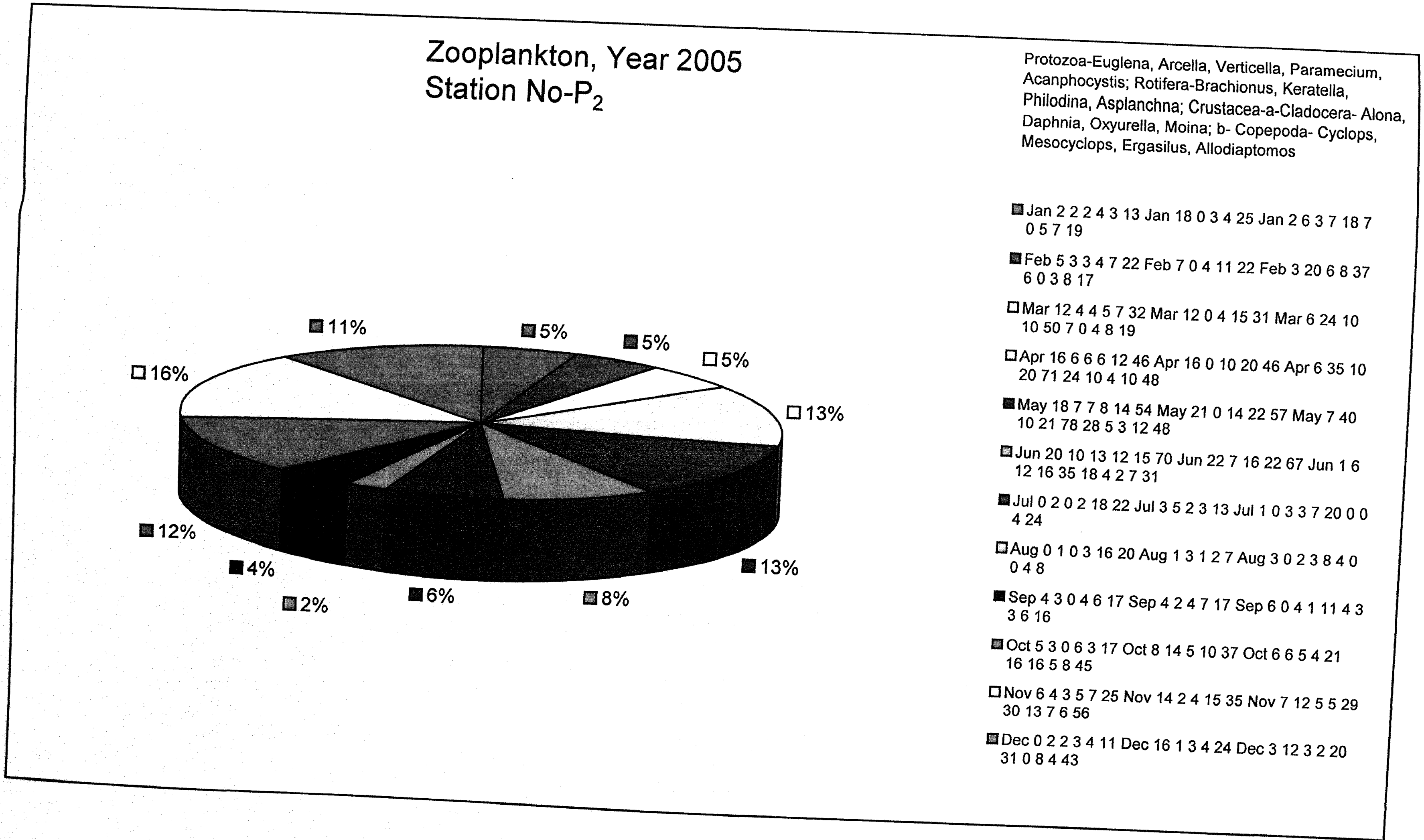
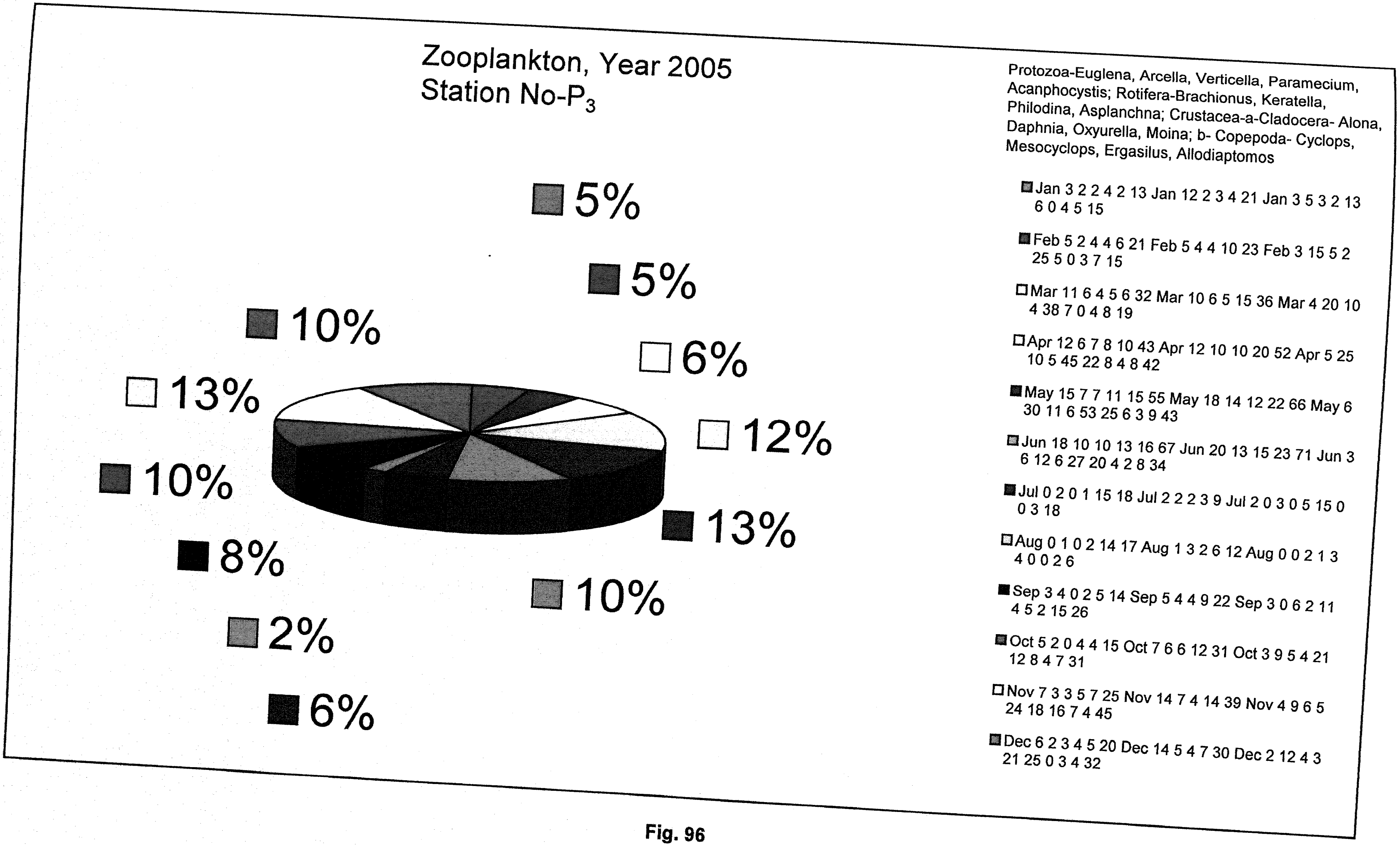
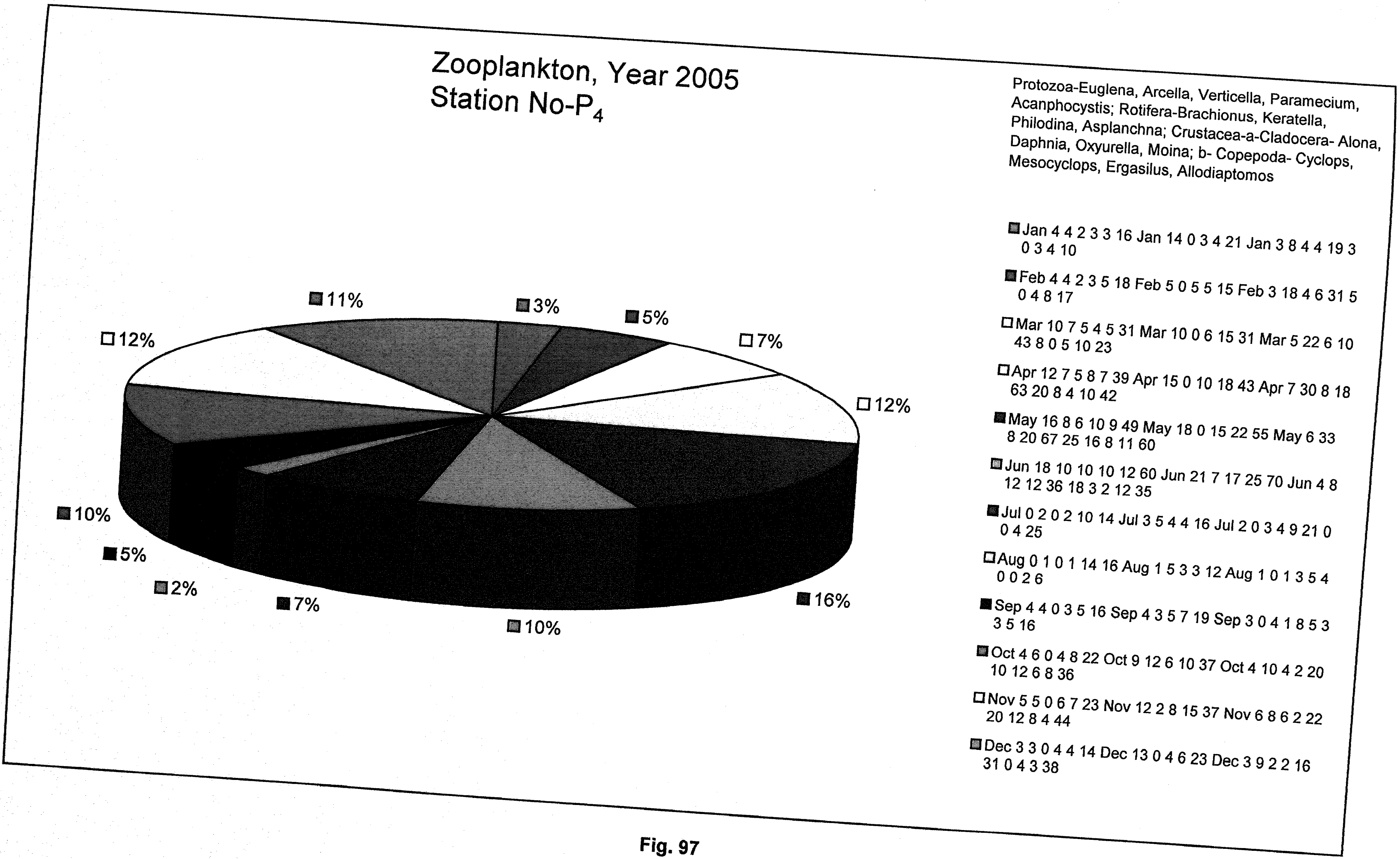

Zooplankton, Year 2005
Station No-P2
Protozoa-Euglena, Arcella, Verticella, Paramecium, Acanphocystis; Rotifera-Brachionus, Keratella, Philodina, Asplanchna; Crustacea-a-Cladocera- Alona, Daphnia, Oxyurella, Moina; b- Copepoda- Cyclops, Mesocyclops, Ergasilus, Allodiaptomos
Jan 2 2 2 4 3 13 Jan 18 0 3 4 25 Jan 2 6 3 7 18 7 0 5 7 19
Feb 5 3 3 4 7 22 Feb 7 0 4 11 22 Feb 3 20 6 8 37 6 0 3 8 17
Mar 12 4 4 5 7 32 Mar 12 0 4 15 31 Mar 6 24 10 10 50 7 0 4 8 19
Apr 16 6 6 6 12 46 Apr 16 0 10 20 46 Apr 6 35 10 20 71 24 10 4 10 48
May 18 7 7 8 14 54 May 21 0 14 22 57 May 7 40 10 21 78 28 5 3 12 48
Jun 20 10 13 12 15 70 Jun 22 7 16 22 67 Jun 1 6 12 16 35 18 4 2 7 31
Jul 0 2 0 2 18 22 Jul 3 5 2 3 13 Jul 1 0 3 3 7 20 0 0 4 24
Aug 0 1 0 3 16 20 Aug 1 3 1 2 7 Aug 3 0 2 3 8 4 0 0 4 8
Sep 4 3 0 4 6 17 Sep 4 2 4 7 17 Sep 6 0 4 1 11 4 3 3 6 16
Oct 5 3 0 6 3 17 Oct 8 14 5 10 37 Oct 6 6 5 4 21 16 16 5 8 45
Nov 6 4 3 5 7 25 Nov 14 2 4 15 35 Nov 7 12 5 5 29 30 13 7 6 56
Dec 0 2 2 3 4 11 Dec 16 1 3 4 24 Dec 3 12 3 2 20 31 0 8 4 43
11%
5%
5%
5%
16%
13%
12%
4%
13%
2%
6%
8%

Fig. 95



Zooplankton, Year 2005
Station No-P_3
5%
5%
6%
12%
13%
10%
6%
2%
8%
10%
13%
10%
Protozoa-Euglena, Arcella, Verticella, Paramecium, Acanphocystis; Rotifera-Brachionus, Keratella, Philodina, Asplanchna; Crustacea-a-Cladocera- Alona, Daphnia, Oxyurella, Moina; b- Copepoda- Cyclops, Mesocyclops, Ergasilus, Allodiaptomos
Jan 3 2 2 4 2 13 Jan 12 2 3 4 21 Jan 3 5 3 2 13 6 0 4 5 15
Feb 5 2 4 4 6 21 Feb 5 4 4 10 23 Feb 3 15 5 2 25 5 0 3 7 15
Mar 11 6 4 5 6 32 Mar 10 6 5 15 36 Mar 4 20 10 4 38 7 0 4 8 19
Apr 12 6 7 8 10 43 Apr 12 10 10 20 52 Apr 5 25 10 5 45 22 8 4 8 42
May 15 7 7 11 15 55 May 18 14 12 22 66 May 6 30 11 6 53 25 6 3 9 43
Jun 18 10 10 13 16 67 Jun 20 13 15 23 71 Jun 3 6 12 6 27 20 4 2 8 34
Jul 0 2 0 1 15 18 Jul 2 2 2 3 9 Jul 2 0 3 0 5 15 0 0 3 18
Aug 0 1 0 2 14 17 Aug 1 3 2 6 12 Aug 0 0 2 1 3 4 0 0 2 6
Sep 3 4 0 2 5 14 Sep 5 4 4 9 22 Sep 3 0 6 2 11 4 5 2 15 26
Oct 5 2 0 4 4 15 Oct 7 6 6 12 31 Oct 3 9 5 4 21 12 8 4 7 31
Nov 7 3 3 5 7 25 Nov 14 7 4 14 39 Nov 4 9 6 5 24 18 16 7 4 45
Dec 6 2 3 4 5 20 Dec 14 5 4 7 30 Dec 2 12 4 3 21 25 0 3 4 32

Fig. 96



Zooplankton, Year 2005
Station No-P4
Protozoa-Euglena, Arcella, Verticella, Paramecium, Acanphocystis; Rotifera-Brachionus, Keratella, Philodina, Asplanchna; Crustacea-a-Cladocera- Alona, Daphnia, Oxyurella, Moina; b- Copepoda- Cyclops, Mesocyclops, Ergasilus, Allodiaptomos
Jan 4 4 2 3 3 16 Jan 14 0 3 4 21 Jan 3 8 4 4 19 3 0 3 4 10
Feb 4 4 2 3 5 18 Feb 5 0 5 5 15 Feb 3 18 4 6 31 5 0 4 8 17
Mar 10 7 5 4 5 31 Mar 10 0 6 15 31 Mar 5 22 6 10 43 8 0 5 10 23
Apr 12 7 5 8 7 39 Apr 15 0 10 18 43 Apr 7 30 8 18 63 20 8 4 10 42
May 16 8 6 10 9 49 May 18 0 15 22 55 May 6 33 8 20 67 25 16 8 11 60
Jun 18 10 10 10 12 60 Jun 21 7 17 25 70 Jun 4 8 12 12 36 18 3 2 12 35
Jul 0 2 0 2 10 14 Jul 3 5 4 4 16 Jul 2 0 3 4 9 21 0 0 4 25
Aug 0 1 0 1 14 16 Aug 1 5 3 3 12 Aug 1 0 1 3 5 4 0 0 2 6
Sep 4 4 0 3 5 16 Sep 4 3 5 7 19 Sep 3 0 4 1 8 5 3 3 5 16
Oct 4 6 0 4 8 22 Oct 9 12 6 10 37 Oct 4 10 4 2 20 10 12 6 8 36
Nov 5 5 0 6 7 23 Nov 12 2 8 15 37 Nov 6 8 6 2 22 20 12 8 4 44
Dec 3 3 0 4 4 14 Dec 13 0 4 6 23 Dec 3 9 2 2 16 31 0 4 3 38
12%
11%
3%
5%
7%
12%
16%
10%
7%
2%
5%
10%

Fig. 97

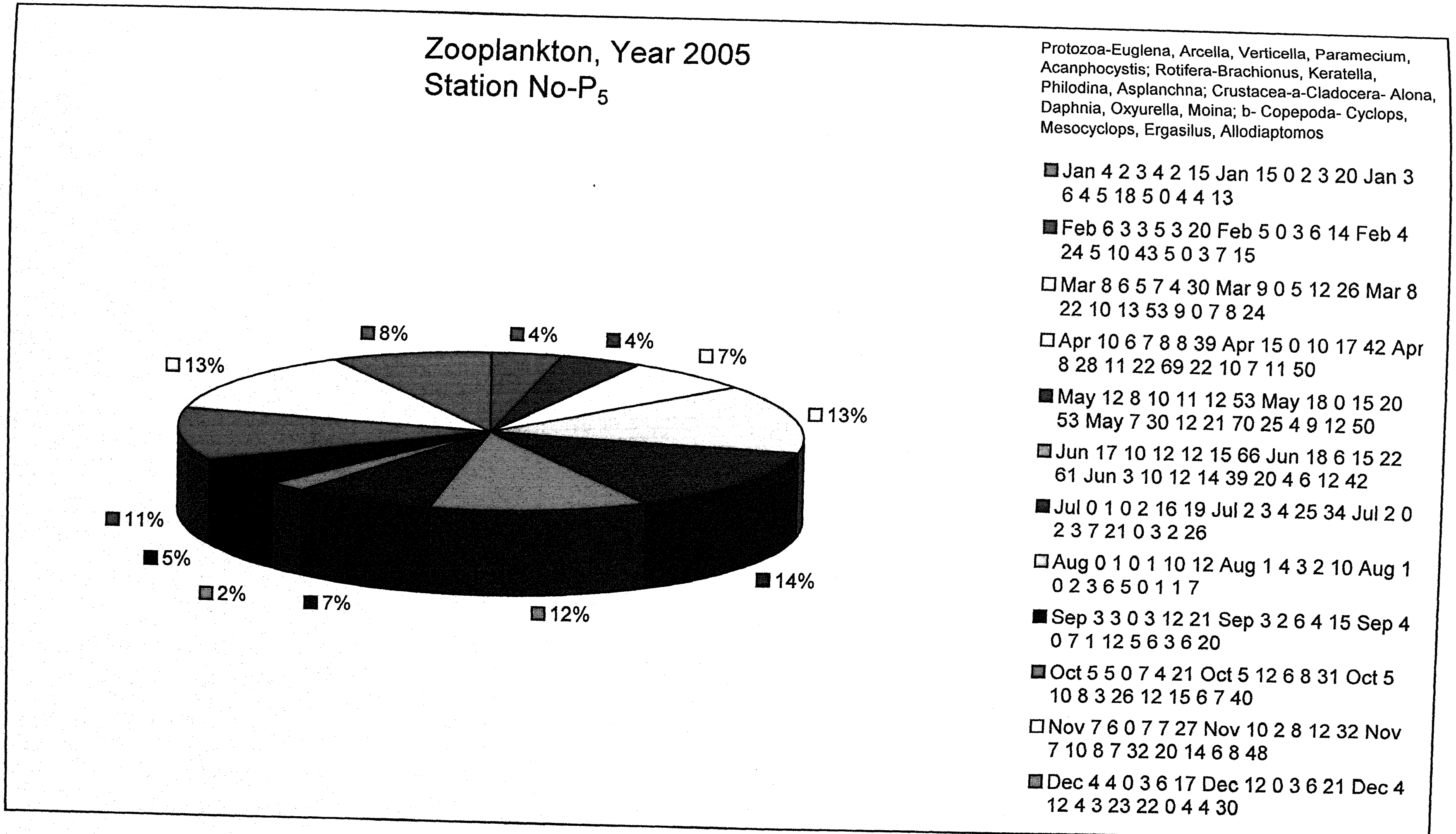

Zooplankton, Year 2005
Station No-P_5
13%
8%
4%
4%
7%
13%
11%
5%
2%
7%
12%
14%
Protozoa-Euglena, Arcella, Verticella, Paramecium, Acanphocystis; Rotifera-Brachionus, Keratella, Philodina, Asplanchna; Crustacea-a-Cladocera- Alona, Daphnia, Oxyurella, Moina; b- Copepoda- Cyclops, Mesocyclops, Ergasilus, Allodiaptomos
Jan 4 2 3 4 2 15 Jan 15 0 2 3 20 Jan 3 6 4 5 18 5 0 4 4 13
Feb 6 3 3 5 3 20 Feb 5 0 3 6 14 Feb 4 24 5 10 43 5 0 3 7 15
Mar 8 6 5 7 4 30 Mar 9 0 5 12 26 Mar 8 22 10 13 53 9 0 7 8 24
Apr 10 6 7 8 8 39 Apr 15 0 10 17 42 Apr 8 28 11 22 69 22 10 7 11 50
May 12 8 10 11 12 53 May 18 0 15 20 53 May 7 30 12 21 70 25 4 9 12 50
Jun 17 10 12 12 15 66 Jun 18 6 15 22 61 Jun 3 10 12 14 39 20 4 6 12 42
Jul 0 1 0 2 16 19 Jul 2 3 4 25 34 Jul 2 0 2 3 7 21 0 3 2 26
Aug 0 1 0 1 10 12 Aug 1 4 3 2 10 Aug 1 0 2 3 6 5 0 1 1 7
Sep 3 3 0 3 12 21 Sep 3 2 6 4 15 Sep 4 0 7 1 12 5 6 3 6 20
Oct 5 5 0 7 4 21 Oct 5 12 6 8 31 Oct 5 10 8 3 26 12 15 6 7 40
Nov 7 6 0 7 7 27 Nov 10 2 8 12 32 Nov 7 10 8 7 32 20 14 6 8 48
Dec 4 4 0 3 6 17 Dec 12 0 3 6 21 Dec 4 12 4 3 23 22 0 4 4 30

Fig. 98

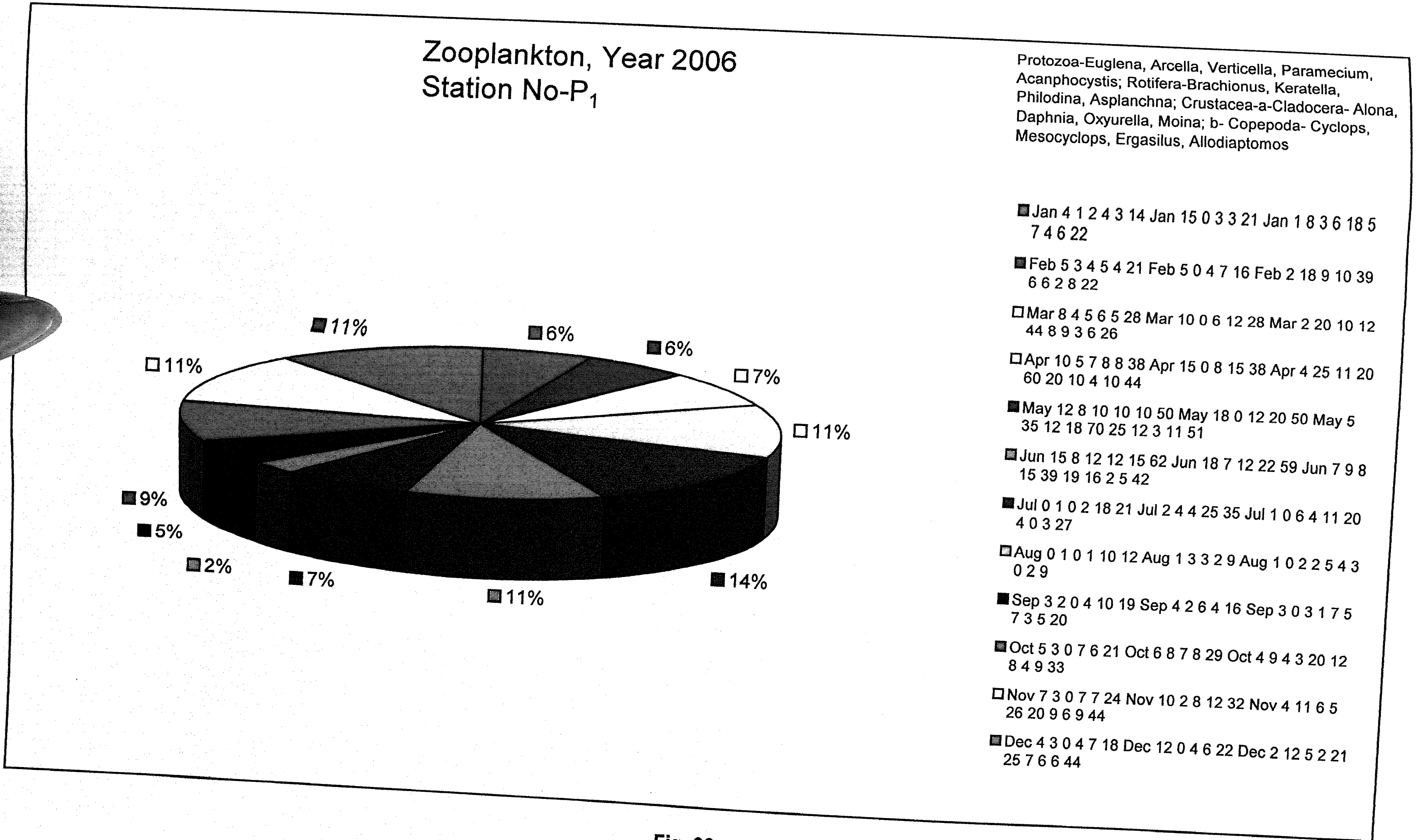
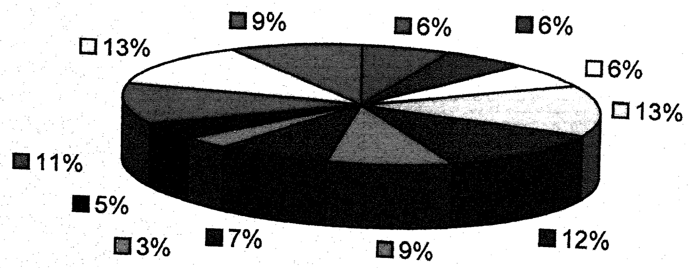

Zooplankton, Year 2006
Station No-P_1
11%
11%
6%
6%
7%
11%
9%
5%
2%
7%
11%
14%
Protozoa-Euglena, Arcella, Verticella, Paramecium, Acanphocystis; Rotifera-Brachionus, Keratella, Philodina, Asplanchna; Crustacea-a-Cladocera- Alona, Daphnia, Oxyurella, Moina; b- Copepoda- Cyclops, Mesocyclops, Ergasilus, Allodiaptomos
Jan 4 1 2 4 3 14 Jan 15 0 3 3 21 Jan 1 8 3 6 18 5 7 4 6 22
Feb 5 3 4 5 4 21 Feb 5 0 4 7 16 Feb 2 18 9 10 39 6 6 2 8 22
Mar 8 4 5 6 5 28 Mar 10 0 6 12 28 Mar 2 20 10 12 44 8 9 3 6 26
Apr 10 5 7 8 8 38 Apr 15 0 8 15 38 Apr 4 25 11 20 60 20 10 4 10 44
May 12 8 10 10 10 50 May 18 0 12 20 50 May 5 35 12 18 70 25 12 3 11 51
Jun 15 8 12 12 15 62 Jun 18 7 12 22 59 Jun 7 9 8 15 39 19 16 2 5 42
Jul 0 1 0 2 18 21 Jul 2 4 4 25 35 Jul 1 0 6 4 11 20 4 0 3 27
Aug 0 1 0 1 10 12 Aug 1 3 3 2 9 Aug 1 0 2 2 5 4 3 0 2 9
Sep 3 2 0 4 10 19 Sep 4 2 6 4 16 Sep 3 0 3 1 7 5 7 3 5 20
Oct 5 3 0 7 6 21 Oct 6 8 7 8 29 Oct 4 9 4 3 20 12 8 4 9 33
Nov 7 3 0 7 7 24 Nov 10 2 8 12 32 Nov 4 11 6 5 26 20 9 6 9 44
Dec 4 3 0 4 7 18 Dec 12 0 4 6 22 Dec 2 12 5 2 21 25 7 6 6 44

Fig. 99

Zooplankton, Year 2006
Station No-P_2

Protozoa-Euglena, Arcella, Verticella, Paramecium, Acanphocystis; Rotifera-Brachionus, Keratella, Philodina, Asplanchna; Crustacea-a-Cladocera- Alona, Daphnia, Oxyurella, Moina; b- Copepoda- Cyclops, Mesocyclops, Ergasilus, Allodiaptomos



- Jan 1 2 2 5 3 13 Jan 15 0 5 4 24 Jan 3 6 4 6 19 6 0 6 7 19
- Feb 5 2 3 4 7 21 Feb 7 0 6 8 21 Feb 4 3 4 8 19 6 0 4 8 18
- Mar 12 4 4 5 8 33 Mar 10 0 7 14 31 Mar 5 21 8 10 44 7 0 4 9 20
- Apr 14 6 6 6 12 44 Apr 14 0 10 18 42 Apr 6 26 8 20 60 20 10 5 10 45
- May 15 6 8 7 14 50 May 20 0 12 20 52 May 9 32 10 22 73 26 5 3 7 41
- Jun 20 8 12 12 16 68 Jun 21 7 16 21 65 Jun 1 6 12 15 34 18 4 2 4 28
- Jul 0 2 0 2 18 22 Jul 3 5 3 3 14 Jul 1 0 3 4 8 20 0 0 4 24
- Aug 0 1 0 2 15 18 Aug 1 4 1 2 8 Aug 3 0 2 2 7 4 0 0 6 10
- Sep 4 3 0 4 7 18 Sep 3 3 3 8 17 Sep 6 0 4 1 11 3 3 2 7 15
- Oct 7 3 0 5 4 19 Oct 8 12 5 11 36 Oct 6 6 6 3 21 10 15 5 6 36
- Nov 7 4 2 5 8 26 Nov 12 3 3 14 32 Nov 7 12 6 5 30 15 13 7 6 41
- Dec 0 3 2 2 3 10 Dec 15 0 4 3 22 Dec 3 11 3 2 19 20 0 6 4 30

Fig. 100

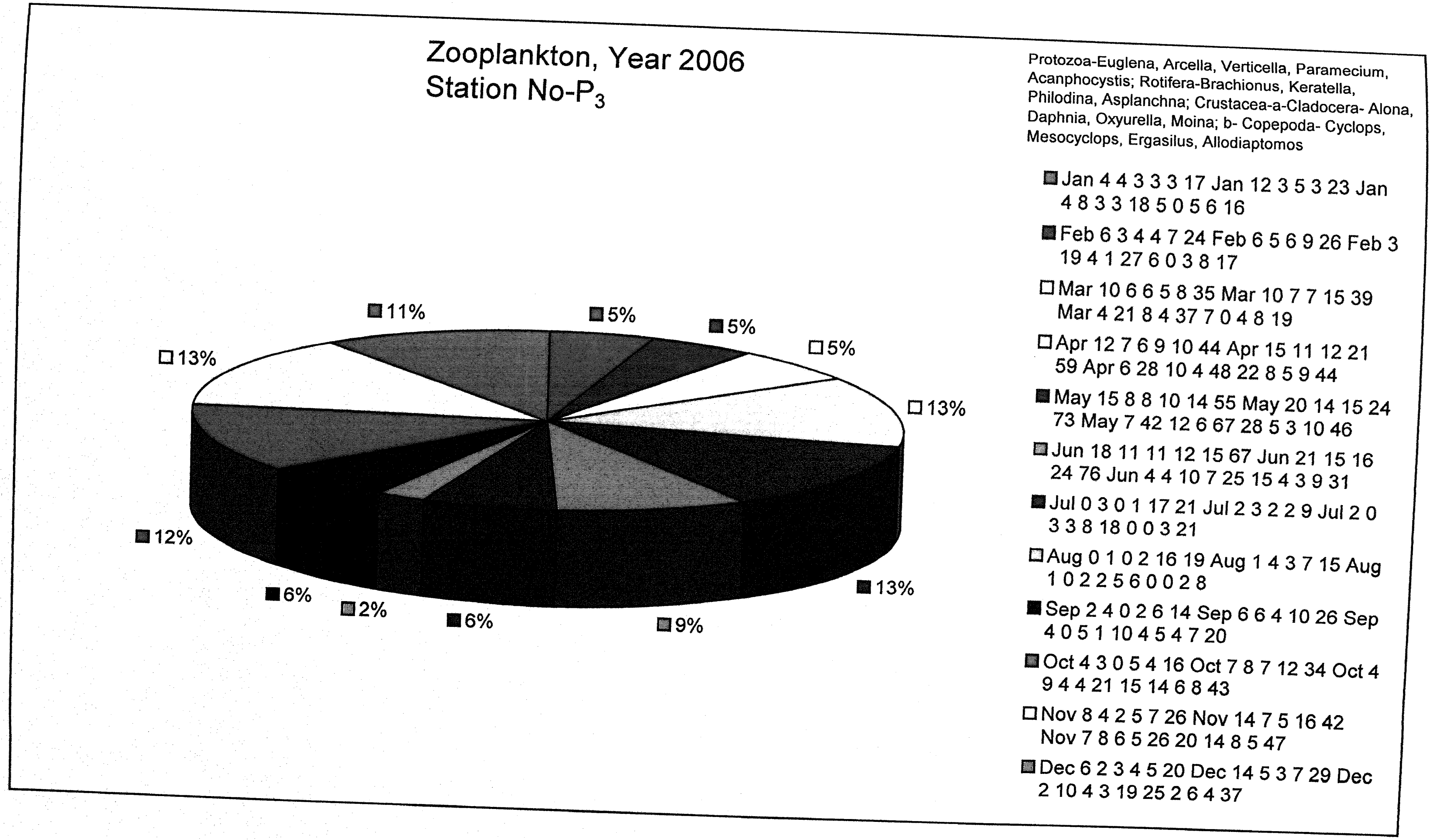
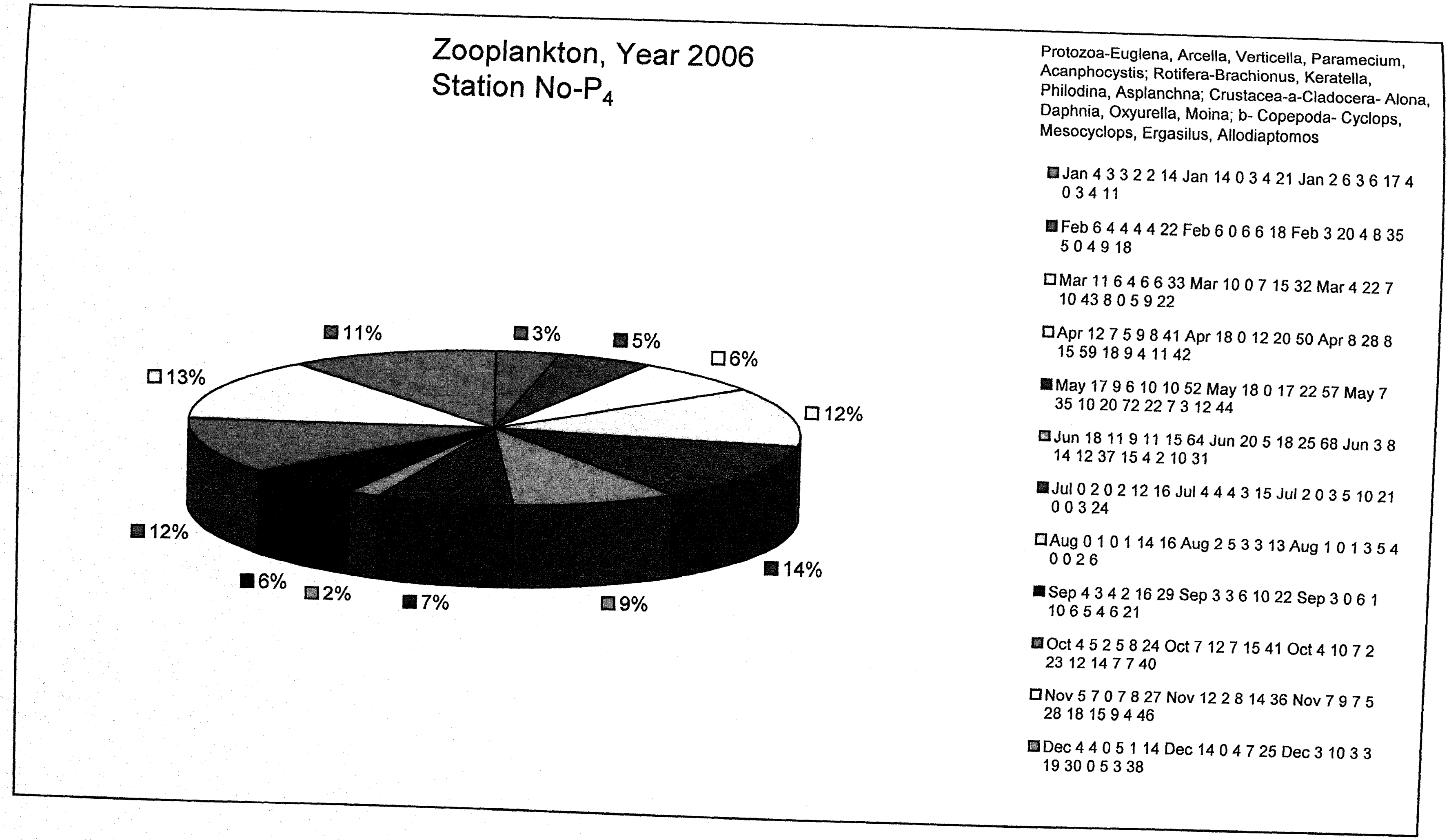

Zooplankton, Year 2006
Station No-P3
Protozoa-Euglena, Arcella, Verticella, Paramecium, Acanphocystis; Rotifera-Brachionus, Keratella, Philodina, Asplanchna; Crustacea-a-Cladocera- Alona, Daphnia, Oxyurella, Moina; b- Copepoda- Cyclops, Mesocyclops, Ergasilus, Allodiaptomos
Jan 4 4 3 3 3 17 Jan 12 3 5 3 23 Jan 4 8 3 3 18 5 0 5 6 16
Feb 6 3 4 4 7 24 Feb 6 5 6 9 26 Feb 3 19 4 1 27 6 0 3 8 17
Mar 10 6 6 5 8 35 Mar 10 7 7 15 39 Mar 4 21 8 4 37 7 0 4 8 19
Apr 12 7 6 9 10 44 Apr 15 11 12 21 59 Apr 6 28 10 4 48 22 8 5 9 44
May 15 8 8 10 14 55 May 20 14 15 24 73 May 7 42 12 6 67 28 5 3 10 46
Jun 18 11 11 12 15 67 Jun 21 15 16 24 76 Jun 4 4 10 7 25 15 4 3 9 31
Jul 0 3 0 1 17 21 Jul 2 3 2 2 9 Jul 2 0 3 3 8 18 0 0 3 21
Aug 0 1 0 2 16 19 Aug 1 4 3 7 15 Aug 1 0 2 2 5 6 0 0 2 8
Sep 2 4 0 2 6 14 Sep 6 6 4 10 26 Sep 4 0 5 1 10 4 5 4 7 20
Oct 4 3 0 5 4 16 Oct 7 8 7 12 34 Oct 4 9 4 4 21 15 14 6 8 43
Nov 8 4 2 5 7 26 Nov 14 7 5 16 42 Nov 7 8 6 5 26 20 14 8 5 47
Dec 6 2 3 4 5 20 Dec 14 5 3 7 29 Dec 2 10 4 3 19 25 2 6 4 37
11%
5%
5%
5%
13%
13%
12%
6%
2%
6%
9%
13%

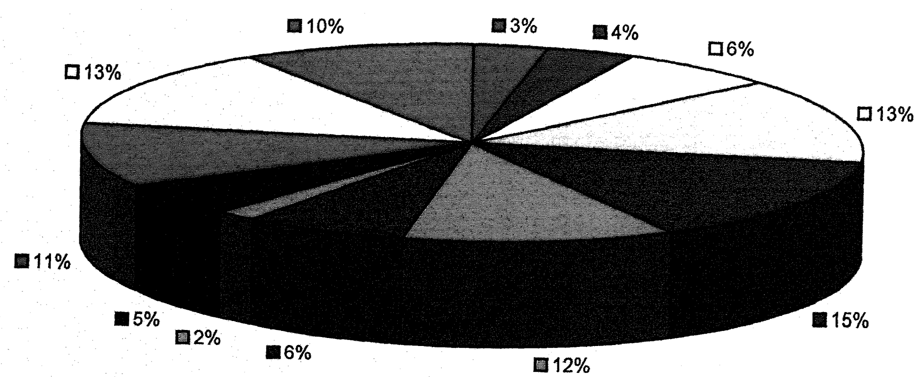
Fig. 101



Zooplankton, Year 2006
Station No-P4
11%
3%
5%
6%
13%
12%
12%
14%
6%
2%
7%
9%
Protozoa-Euglena, Arcella, Verticella, Paramecium, Acanphocystis; Rotifera-Brachionus, Keratella, Philodina, Asplanchna; Crustacea-a-Cladocera- Alona, Daphnia, Oxyurella, Moina; b- Copepoda- Cyclops, Mesocyclops, Ergasilus, Allodiaptomos
Jan 4 3 3 2 2 14 Jan 14 0 3 4 21 Jan 2 6 3 6 17 4 0 3 4 11
Feb 6 4 4 4 4 22 Feb 6 0 6 6 18 Feb 3 20 4 8 35 5 0 4 9 18
Mar 11 6 4 6 6 33 Mar 10 0 7 15 32 Mar 4 22 7 10 43 8 0 5 9 22
Apr 12 7 5 9 8 41 Apr 18 0 12 20 50 Apr 8 28 8 15 59 18 9 4 11 42
May 17 9 6 10 10 52 May 18 0 17 22 57 May 7 35 10 20 72 22 7 3 12 44
Jun 18 11 9 11 15 64 Jun 20 5 18 25 68 Jun 3 8 14 12 37 15 4 2 10 31
Jul 0 2 0 2 12 16 Jul 4 4 4 3 15 Jul 2 0 3 5 10 21 0 0 3 24
Aug 0 1 0 1 14 16 Aug 2 5 3 3 13 Aug 1 0 1 3 5 4 0 0 2 6
Sep 4 3 4 2 16 29 Sep 3 3 6 10 22 Sep 3 0 6 1 10 6 5 4 6 21
Oct 4 5 2 5 8 24 Oct 7 12 7 15 41 Oct 4 10 7 2 23 12 14 7 7 40
Nov 5 7 0 7 8 27 Nov 12 2 8 14 36 Nov 7 9 7 5 28 18 15 9 4 46
Dec 4 4 0 5 1 14 Dec 14 0 4 7 25 Dec 3 10 3 3 19 30 0 5 3 38

Fig. 102

Zooplankton, Year 2006
Station No-P_5



Protozoa-Euglena, Arcella, Verticella, Paramecium, Acanphocystis; Rotifera-Brachionus, Keratella, Philodina, Asplanchna; Crustacea-a-Cladocera- Alona, Daphnia, Oxyurella, Moina; b- Copepoda- Cyclops, Mesocyclops, Ergasilus, Allodiaptomos

- Jan 3 2 3 4 2 14 Jan 12 0 2 4 18 Jan 2 7 2 5 16 4 0 3 3 10
- Feb 5 3 4 5 3 20 Feb 4 0 4 6 14 Feb 4 15 5 8 32 5 0 2 5 12
- Mar 8 4 6 7 4 29 Mar 10 0 6 12 28 Mar 8 20 8 12 48 8 0 5 8 21
- Apr 12 6 7 8 8 41 Apr 15 0 10 16 41 Apr 7 25 10 21 63 20 8 6 10 44
- May 12 9 10 10 12 53 May 18 0 15 20 53 May 7 29 12 18 66 25 4 8 11 48
- Jun 15 12 10 11 15 63 Jun 20 6 15 23 64 Jun 3 6 13 12 34 18 3 6 11 38
- Jul 0 1 0 2 16 19 Jul 21 4 4 24 53 Jul 2 0 2 3 7 18 0 2 1 21
- Aug 0 1 0 1 10 12 Aug 2 4 3 2 11 Aug 1 0 1 2 4 4 0 1 1 6
- Sep 2 4 0 4 12 22 Sep 4 2 6 3 15 Sep 4 0 5 1 10 5 5 3 4 17
- Oct 5 6 0 6 5 22 Oct 8 12 6 7 33 Oct 5 6 7 2 20 12 13 5 5 35
- Nov 6 7 0 5 8 26 Nov 11 2 7 10 30 Nov 7 7 8 4 26 20 12 5 6 43
- Dec 3 4 0 3 7 17 Dec 6 0 3 6 15 Dec 3 10 3 2 18 25 0 3 4 32

Fig. 103

Biological Analysis

Under this microflora (Phytoplankton), microfauna (zooplankton & coliform bacteria), M.P.N., macroflora (Aquatic weeds) and macrofana (economically important fishes were studied.

Plankton

Phytoplankton (Micro flora)

Phytoplanktons in water bodies are very helpful to assess the basic nature of the water. They release oxygen in water by photosynthesis, which is consumed by fishes but execos into phytoplankton make the water eutrophic and cause water pollution.

In the investigation the phytoplankton were observed qualitiatively and quantitavely which belong to the groups viz Chlorophyceae, Bacillarophyceae and cyanophyceae (Mixophyceae). The qualitive and quantitative fluctuations of phytoplankton population depend upon its ecosystem. These organisms have an intimate relationstion with the environmental factors and thus the structure of phytoplantonic conmmuity changes in different seasons, due to variation in environmental factors and also by addition of pollutants, The homeosatic factors lead to the change in floral and faunal composition. Several workers have studied phytoplanktonic commanities and their seasonal variation and composition in running water habitats. i.e.. zafer (1986) reported such variations in some south-Indian lakes. During the course of study period chlorophyceae group was dominant over rest of the phyceae groups of phytoplankton population.

Group A-Chlorophyceae- Group chlorophyceae varied from 10 org/l to 151 org/l during the period of 2005 and in the year 2006 varied from 13 org/l to 148 org/l at all the sampling stations. The phytoplankton in Paisuni river, were lowest during rainy season and higher during winter season and highest during summer season,

due to much concentration of nutrients and low amount of water and high photosynthesis due to long photo period and high temperature too. On the other hand during rains the dilution of water and increased turbidity, recedes the number besides the torrential water currents act as limiting factor for the plankters. Whereas in the winter season, the intensified growth of plankton was due to the lessering of the above mentioned limiting factors. Besides seasonal changes in the density of chlorophyceae the pollutional load also affects on their no. of as spp. pollution advances the sensitive species taking off their niche from such a place while the hardy species survive further by increasing their biomagnification and bioaccumulation.

Ray (1955) studied the plankton of river Hooghly at Palt in west Bengal. Kant & Anand (1978) discribed a gradual rise in temperature from February onwards as optimal condition for growth and reproduction of chlorophyceae. During the present study there was a gradual rise in the population of chlorophyceae from february on wards and touched a peak level in April to June. These findings are in conformation with the present study.

GRoup B- Bacillariophyceae- In the river Paisuni group Bacillariophyceae was recorded between 7 org/l to 112 org/l during the period of 2005 and in the year 2006 it varied from 6 org/l to 113 org/l. The greatest value was observed in the month of June in both the years of study, due to decomposition of organic wastes, which serve as a good source of nutrient and stimulate the growth of plankton where as lowest value of record in the rainy season in the month of August due to strong current velocity and low water temperature.

Among Bacillariophyceae different phytoplanktons were found at all the sampling stations. Their name were Navicula , Synebra , Tabellaria , Fragillaria , Cymbella , Nitzschia , Cyclotella , Astorionella , Pinnularia.

High turbidity produces an injurious blanketting effect on the phytoplankton and kills them (Welch, 1952, Roy , 1955 and Chakrabarty et. al. 1959). In the summer month (May and June) peak of diatoms were observed. A direct relationship of temperature with phytoplankton population was recorded by Sharma and Pant (1979). In the study period that group Bacillariophyceae was dominant in the summer.

Group C- Cyanophyceae- Blue-green algae were the second dominant group among phytoplanktonic community. These are useful for phytosynthetic ability, chemotrophic and hetrotrophic capabilities. It is mostely high in summer season due to more pollution and high temperature.

Among cynophyceae, Agmenellum , Rivularia , Anabaena , Oscillatoria , Microcystis, Gompospaeria were found during investigation at different spots.

Group cynophyceae varied from 5 org/l to 85 org/l during the period of 2005 and in 2006 it ranged from 6 org/l to 83 org/l Microcystis was most dominent number of blue-green algae. Oscillatoria is more responsible for eutrophic condition. During the study period high level of ammonical nitrogen and organic matter were found more which are responsible for growth of blue-green algae. The greenish colour of water during summer was imported by tremendous amount of small spheres of Rivularia occurring during this period. A strong positive correlation was also found between blue-green algae and phosphate. Blue-green algae in river Gomati changed their spectrum and composition and specific tax a exhibited definite zonations and affinities to respective pollution levels (Prasad and Saxena, 1980).

The above discussion it is evident that blue-green algae found only at some stations having high temperature organic matter coupled with low D.O. condition under which blue-green thrive well as compared to other classes of algae.

The characteristic feature of blue-green algae is for growth and protection of crop therefore it is good fertilizers for the paddy fields.

Zooplankton (Micro-Fauna)

The zooplankton occupy an intermediary position between the autotrophs and the carnivorous and form an important link in aquatic food webs. The zooplanktonic animals in fresh waters are dominated by Rotifera , Cladocera and Copepoda. Protozoa also forms a significant part of the fresh water zooplankton, especially in systems exhibiting advanced trophic state. The pollution load affect the presence of zooplankton, their namber and behaviour.

The presence of rotifers throughout the stretch of the river suggested that the nutrient level of the river has gone considerably high in general and the organic pollution. The concentration of zooplankton in clear water zone was quite rich as regards to both the number and the species. The crustaceans with nauplius stage of copepoda formed the dominant group and Rotifera were represented by a large variety of species.

It has been reported that zooplankton favour less light and moderate temperature and these are directly related with dissolved oxygen (Singh and Singh, 1985), Lall et. al. (1986) pointed out that poor density of zooplankton and abiotic factors indicate oligotrophic condition.

In the study period the Protozoa varied between 3 org/l to 70 org/l in the year 2005 and the year 2006 it ranged between 12 org/l to 67 org/l. Rotifera were observed four genera, the rotifers were dominant in the summer seasons and co-related with higher alkalinity and temperature condition (Michael, 1964). They were observed in the range of 7 org/l to 76 org/l in the investigation period, their maximum number were seen in the month of June due to turbidity and organic discharge by sewage at all the stations.

Cladocera and copepoda were observed four genera each. Cladocera varried 3 org/l to 73 org/l in both year of the study where as copepoda ranged from 6 org/l to 60 org/l in the year 2005 and in 2006 it found 6 org/l to 51 org/l.

Cladocera and copepoda dominated during monsoon season, where as Rotifers dominated during summer. Due to high turbidity and high alkalinity crustacea found maximum in rainy season.

Concluding the higher values in summer season express the repercussions of pollution in it on account of less water flow and the higher discharge of organic waste waters and effluents. Phytoplankton serve as food of Zooplankton and their abundance during summer season might have enhanced the population of the zooplankton.

Total Coliform (M.P.N.)

A measure of the degree of microbial pollution is needed to determine the suitability of the water for drinking, swimming or snelifish harvesting several types of Bacteria are found in water and each type has its own optimal requirements of growth and development. Hence bacterial community of water represents the environmental conditions contaminated water harbours several becteria causing diseases such as typhoid, fever, dysentery, diarrhoea and chalera. These pathogenic bacteria present in contaminated water bodies are due to domestifc sewage and other pollutants. All bacteria require phosphate which is utilized by growing organisms almost as fast as it is made available. The bacteriological examination of water has a special significance in pollution as the bacteria adversely affects human health. Bacteria population is often considered as valuable indicators of pollution. The eutrophication in aquatic ecosystem and high count in water is harmful for drinking and bathing purposes. So it is the most useful microbiological parameter for assessing the quality of any water supply.

A desirable limit of coliform is Zero number/100ml. in drinking water recommended by WHO. The actual number of coliform is difficult to report therefore they are reported as an approximate count, i.e. most probable number (MPN).

In the present investigation high coliform number was found during the entire study. The MPN of coliform organisms fluctuated from 60 to 2000/100ml. in the year 2005 while in 2006 from 55 to 2000/100ml. at different sampling stations.

The mean value of MPN during the study period of 2005 varied from 420.08 to 633.15/100ml and in 2006 ranged from 392.66 to 634.83/100ml at different sampling stations. Maximum count of bacteria was noticed in summer and monsoon period at station. I, II, III and IV due to temperature conditions, pollutints run-off and sewage from nearly area as a result of the leaching of soil and organic matter etc. while minimum count was observed in winter season due to low temperature and lack of run-off.

Among the bacteria coliform group is fequently used to assess the degree of pollution by excreta of worm blooded animals. Some more frequently used indicators of feacal pollution include feacal streptococci and clostridium perbringers. Bonde (1977), Upadhyay (1997) observed the water quality of Kaliasota dam and reported that the MPN count fluctuated from 240 to 2400+/100ml.

Besides So, the high count of bacteria in the above reported waterbody, which resembles to same extent with the present work fair occassions the regular mass bathing activities increase the bacterial pollution all over the strech of river Paisuni at Chitrakoot. The coliform load in river water indicates the bacteria are always and under all conditions remain in water body. Total coliform showed significant positive correlation with temperature, turbidity at most of the selected stations from I to V during the study period.

Aquatic Weeds (Macro-flora)

So, many unwanted aquatic weeds viz- Marselia , Azolla, Hydrilla , Vallisneria, Lemna etc. grow prolifically in water due to ammonical nitrogen and phospharus, they reach in water through the sewage and run-off which cause water pollution and water born diseases. Excessive growth of aquatic weeds prevents effective utilization of water and reduces productivity. They check free movement of the fishes and cause oxygen depletion and accumulation of carbon-di-oxide. Gases like hydrogen sulphides and methane are formed which are harmful to the fishes. Algal blooms choke the gills and spoil the water on rotting.

The accompanying economical losses caused to the farmers, traders, fisheries and public utilities are often considerable (Sculthrope, 1967). These are the harmful than beneficial for fish culture. It's menace by blocking water ways and interfering with hydroelectric production, washing, water in evapotranspiration hindering traffic and fishing which causes water borne diseases (Katyal and Stoke, 1989). The prolifically growth of aquatic weeds chocke many rivers, irrigational canals, ponds and lakes in India, resulting direct and indirect losses.

The human activity spot on the rivers become heavily infested with a variety of aquatic weeds which cause interference with a variety of aquatic weeds with the religious ablution of the pilgrims (Datta and Gupta, 1976).

In the study period (2005-2006), it was noticed that the free floating species, Azolla species , Lemna Paucicostata , Eichhorinia crassipes etc. were found and their growth started from october and made scum in some regions and they began to deplete from April on wards whereas submerged species Potamogeton spp. were very small in number which disappeared in monsoon period, Hydrilla and Vallisneria are the most abundant at stations IV and V. This density becomes less in monsoon period while vallisneria occurs in shallow parts.

Submerged and floating level form maximum coverage and pure as well as mixed associations in deeper parts of the river where they blocked it and reduced the flow of water. Hydrilla spp., Vallisneria spp., Potamogeton spp. from sub aquatic meadows in the marshy and shallow isolated channels at stations III and IV.

Abundance of macro vegetation appeared with the arrival of rainy season. A large amount of minerals and organic matter are discharged in to the river from te nearby areas including domestic sewage and added to the fertility of the bottom soil. Silting of the river varied according to nature of the river basin bad discharge of row domestic sewage and other wastes were also responsible for the enrichment of the bottom, mineral soil such soil promosed the luxuriant growth of the weeds, besides weeds decay material added to the fertility of the bed.

The aquatic weeds which are menace to the reverine system as the river paisuni is also affected by this, so its management canbe made by taking measures bu taking out off for the use as ammonical nitrogen, phosphate and good manure which can be obtained by composting these weeds in pits which may be utilized for agricultural lands as fertilizers.

Fish fauna (Macro fauna)

Fishes are major economically important production of aquatic habitats water pollution affects all aquatic organisms along with fish which is done by various human activities. These adversly affect physical and chemical factors of the water.

As fishes constitute economically a very important group of animals. The importance of fish culture as a source of food production was then driven home more realistically and emphasis was laid on the need for extending fish culture activities to all the parts of the country with a view to developing the industry on scientific lines in private and public sectors (Jhingran, 1991).

Besides being used as food, fish lives in an important source of oil containing vitamins. A and D, their body oil is used in soap industry and tanning. Fishes also yield fish meal, fish manure, isinglass and several other by products of commercial value.

The present investigation revealed that various fishes of economic values are found in the river Paisuni Labeo rohita, Lapeo bata, Cirrihinus mrigala, Mystus seenghala, wallago attu, Rita rita, Clarias batrachus and Heteropneustes fossilis were more abundant in river Paisuni during the period of study (2005-2006).

Zoological survey of India (1991) has published that about 400spp. of fishes which are found in Indian water. Gunther (1880) found 26 families in India, Day (1885) reported 87 genera in India fresh water.

SUMMARY

SUMMARY

India is blessed with a vast inland water resources in the form of rivers, estuaries, natural and man made lakes, ponds, brackish water impoundnents and mangroove wetlands. The estimated total length of rivers in India is about 29000Km. The rivers water quality is assessed by the study of physical, chemical and biological factors, which are considered for the beneficial use of water and also for proper fish culture. Any characteristic of water that affects the survival, reproduction, growth, production or management of fish in any way depends upon variable water quality.

The river Paisuni is a holy river. It's stretch is from the Raghav Prayag Sangam at Ramghat in Chitrakoot upto Kankota, Rajapur which is 45 Km. This area is in Karvi district of Chitrakoot Dham division. The Chitrakoot is of international fame due to lord Ram who came here in Treta Yug.

This river is a plateau river and confluences with the river Yamuna at Kankota in Rajapur. It's basin lies between the latitude $25^0 4'$ N longitude $80^0 45'$ E. Different types of sampling stations were selected to explore the entire river as regards the pollution, micro and macro flora & fauna. The quality of river water was studied by selecting five sampling stations for the estimation of the characteristics of water in reference to physico-chemical and biological conditions. The main aim of the study is to find out the optimum range of factors in water for remarkable fish production along with potability of water for which scientific measures are also suggested.

Regarding the eastimination of physico-chemical and biological factors along with fish productivity and potability of water the contributions of important workers recorded in thesis, journals, books, reports of WHO & Indian standards etc. are stated in review of literature.

This study was under taken for the period of two years (January 2005 to

December 2006), taking into consideration the physiography and other significant features of the entire river. Five sampling stations were selected in catchment area of river Paisuni. The sampling stations are P_1 - Ramghat, P_2 - Patha inlet, P_3 - Patha outlet, P_4 - Kalvilya, P_5 - Kan Kota.

Detailed observations were recorded for the said two years and their impact on the river water characteristics was marked by chemical analysis, which was performed as per the standard methods (A.P.H.A., 1998). Statistically coefficient correlationship was also established between various physico-chemical and biological factors. Besides standard deviations has also been done.

The Physical Parameters are colour of water, water temperature, water current, Turbidity.

The chemical Parameters are Hydrogen Ion-concentration, carbonates, Bicarbonates, Total Alkalinity, Total Hardness, Dissolved oxygen, Bilogical Oxygen Demand, Chemical Oxygen Demand, Ammonical Nitrogen, Nitrite, Nitrate, Phosphate, Shulphate, Sodium, Potasium, Free Carbon-di-oxide, Fluoride.

The biological factors are plankton (phyto and zoo plankton), Total coliform (MPN), Aquatic weeds and fish fauna were studied.

Meteorological conditions are atmospheric temperature, photoperiod, relative hamidity and rain fall were recorded for the period of two years of study, which have direct impact on physical chemical and biological facters.

Under the meteoreological conditions the atmospheric temperature was maximum in the month of June and minimum in January were recorded and the photo period was maxium in June and minimum in January, this recorded in different seasons. The atmospheric temperature showed positive relationship to photo

period whereas relative humidity was also positively related to the rainfall. All the meteorological conditions have direct impact on the river water. The colour of the water was found variable muddy, greenish and transparent, which indicated algal growh or turbidity.

The water temperature ranged from 17.00°C to 36.30°C . The maximum in the month of June and minimum in the month of January during the entire study period. It showed positive co-relation with atmospheric temperature.

Turbidity is quite an essential parameter in determining productivity of water. It is caused by clay silt, organic matter, phytoplankton and other micro-organisms. The turbidity of river water under study was noted maximium during rainy season due to high wind velocity and rainfall respectively and lowest in winter season due to less number of plankton density and lack of organic matter. Turbidity showed positive co-relation with Total Hardness and negative relation with photosynthetic activities.

The water current was found highest in rainy season and minimum during summer season. The maximum value of water current 1160.50 Cum/Sec. was recorded at station No.-III. The water current was affected by wind velocity and rains also. It plays a great role in fishing and fertility.

The Hydrogen-ion concentration (pH) of river water fluctuated from 7.00 to 8.96 in both the years of study period. The river water was found alkaline throughout the study. Higher pH value in summer was due to the utilization of free carbon-di-oxide during active photosynthesis and minimum value was recorded during winter season due to dissociation of carbonic acid. The maximum value was recorded at the station V due to more organic materials, as it is a confluence point where this Paisuni river join the river Yamuna. It was marked that pH is directly related with

total alkalinity and CO_2 concentration which play an important role in the fluctuation of pH..

The carbonate of water ranged between 14.00ppm. to 27.00ppm. in the first year and in the second year varied between 13.00ppm. to 20.00ppm. The mean value of carbonates fluctuated from 20.08 to 22.36ppm. in the study period. Higher value of carbonate was re-corded due to high photosynthetic activities which favourably affected the aquatic biota.

The Bicarbonates of water ranged between 142.00ppm. to 173.00ppm. in the first year and in the second year ranged between 140.00ppm. to 176.00ppm. The maximum value 176ppm. was noticed at station P_1 due to discharge of waste water and human activity. The minimum value 140.00ppm. was observed at station P_3 due to lack of above factors.

The Total alkalinity is produced by anions mainly carbonates, bicarbonates and hydroxyl-ions. In the study period the total alkalinity fluctuated 162 to 193ppm. The minimum value of total alkalinity was found at station P_4 due to water in fested withaquatic plant and low pH and the maximum value at station P_1. The higher value of total alkalinity was observed during summer season (May) due to low level of water and high decomposition of organic substance. It is showed positive co-reletion with pH at most of the sampling stations during the investigation.

In the study period the value of Hardness varied from 150 to 284ppm. during both the years. The mean value of hardness ranged from 186.66 to 209.16ppm. The minimum value of hardness was observed in the month of August due to more diluation of water, less evaporation. The maximum value of hardness was found at station P_2 in the month of summer season (May) due to domestic sewage and bathing activities. It is caused by calcium and magnisium. The hardness has been

understood to be a measure of the capacity of the water for soap precipitation. It is caused by bivalent metallic cations. A positive correlation was found with T.A. at most of the sampling stations during the investigation.

The high level of the chloride in water causes pollution. The chloride concentration was found in the range of 16.00ppm. to 35.32ppm. in the year of 2005 and in 2006 it range between 15.00ppm. to 35.30ppm. at different sampling stations. The mean value of chloride during the study period varied from 22.76 to 25.54ppm. The maximum concentration was observed at station V due to addition of domestic waste, sewage and municipal solid wastes in to the river water chloride showed positive correlation with water temperature ammonical-Nitrogen. It is also directly related with phytoplankton.

The dissolved oxygen is very important parameter in water quality. In the study period the dissolve oxygen ranged from 5.09ppm. to 9.09ppm. in the year 2005 and in the year 2006 it ranged between 5.03ppm. to 9.07ppm. at different sampling stations. The mean value of dissolved oxygen during the study period was 7.08 to 7.26ppm. The highest value of D.O. was observed during winter season due to low temperature and less decomposition of organic matter, whereas lowest value recorded in summer season due to higher temperature and low water level, which decreases the oxygen holding capacity of water. The D.O. is positively releated with the photosynthesis and fish productivity and inverse relation was found with CO_2. The low D.O. also is the indicator of polluted water.

The Biochemical oxygen Demand varied between 0.90ppm. to 2.29ppm. in the year 2005 and between 1.00ppm. to 2.40ppm. in the year 2006 at different sampling stations. The mean value of B.O.D. during the study period was 1.58 to 1.74ppm. The maximum value of B.O.D. was noticed in month of June due to more decomposition of organic matter at high temperature where as minimum value of

B.O.D. was observed in September because of more dilution of water and self reoxygenation and low temperature. B.O.D. showed significant positive correlation with temperature inverse relationship with D.O.. The high B.O.D. is the indicater of water pollution.

The chemical oxygen Demand value varied from 12.50 to 16.78ppm. in both the years. The mean value of C.O.D. during the study period 13.25 to 14.86 ppm. at different sampling stations. During the investigation the highest value was observed in summer season at station P_2 due to high temperature low water level and washing bathing also. Lowest value was in rainy season due to dilution of water, low water temperature and less organic matters. It was showed positive correlation with temperature and B.O.D. It is helpful to indicate of water quality.

The ammonical nitrogen concentration varied between 0.04 to 0.07ppm. in the entire study period. The mean value varied from 0.04 to 0.05ppm. The minimum concentration was found in the month of August and maximum value was noticed in the month of April. The highest value was found at station P_2 and P_5 due to much feacal matters. It showed possitive correlation with temperature and also related with productivity of the water.

The concentration of nitrite ranged 0.06 to 0.09ppm. The maximum value of nitrite was recorded at station P_5 due to city sewage and feacal matters etc. Nitrite showed a positive correlation with chloride at most of the stations.

The Nitrate varied between 0.10 ppm. to 0.59ppm. in the entire study period. The maximum value was found at station P_5 due to much organic matters. The nitrate showed positive correlation with sulphate and is one of the causes of pollution in water for drinking purpose, but such water is useful for irrigation of agricultural crops.

Phosphate is one of the major nutrient responsible for biological productivity. During the entire study period the level of phosphate content was recorded between 0.13ppm. to 0.42ppm. The maximum concentration was observed at station P_4 in July due to agricultural run-off and sewage which cause eutrophication by excessive growth of flora whereas minimum concentration was noticed in the month of December due to lack of discharge.

The sulphate concentration varied between 11.30 to 32.41ppm. in the year 2005 and between 12.00 to 31.41ppm. in the year 2006 at different sampling stations. The mean value of sulphate during the study period ranged between 18.72 to 22.83ppm. The maximum value was observed in summer season in June month at station P_4 due to deposition of wastes. The sulphate showed positive correlation with phosphate, sodium at most of the monitoring stations.

Sodium is one of the most important elements occuring in nature. It's concentration was found from 30.0 to 48.0ppm. in the year 2005 while in the 2006 it is fluctuated between 30.0 to 45.0ppm. The mean value of sodium in the entire study period varied from 33.40 to 34.70ppm. at different sampling station. BIS has not set any standards for sodium in the drinking water. However, WHO has prescribed limit of 200.0mg/l sodium for drinking water, It showed positive correlation with potassium. As Potassium plays a vital role in the metabolism of fresh water environment. The range of potassium value was between 0.29 to 9.0ppm. in the first year and second year it varied from 0.30 to 9.00ppm. The minimum value was observed in the month of January and the maximum value was observed in the month of August due to receiving sewage and bathing, washing BIS, WHO, USEPA has not set any standard value of potassium for drinking water.

The carbon-di-oxide value was recorded between 12.10 to 18.70ppm. in the year 2005 while in year 2006 varied from 11.00 to 18.80ppm. at different

sampling stations. The maximum value at the station P_3 was found in the study period due to bathing, washing, high temperature and respiration of living organisms. It showed positive correlation with water temperature and inverse relationship with dissolved oxygen and pH. Fluoride is a reactive element. It is toxic and harmful to aquatic biota. Mostly it is derived by indestrial effluents and leaching of chemical fertilizers. But in Paisuni river the above reseorses are not there so. The fluoride is quite negligible oviously the river water is potable and suitable for aquatic biota on this ground.

On the basis of the physico-chemical characteristics, it was concluded that the water in the river is not potable due to turbidity, dissolved oxygen, Total hardness, C.O.D., Total Alkalinity, Ammonical-Nitrogen but it can be used for the purpose of irrigation. The river tends to purify itself during the course of its by oxygenation during its course of flow, besides diffusion & decomposition of organic matters also occur.

In all twenty five species of phytoplankton were identified. Under group chlorophyceae 10 species viz- Chlorella, Ankistrodesmus , Spirogyra , Ulothrix , Zygnema , Microspora , Scenedesmus , Eudorina , Pandorina , Pediastrum , Under group Becillariophyceae 9 species Viz- Navicula , Synebra , Tabellaria , Fragillaria, Cymbella , Nitzschia , Cyclotella , Astorionella , Pinnularia , under group cynophyceae 6 species Viz- Agmenellum , Rivularia , Anabaena , Oscillatoria , Microcystis , Gompospaeria. sp. were identified. The species of phytoplankton found abundantly at all the stations during summer season were Ankistrodesmus , Pediastrum , Navicula , Synebra , Nitzschia , Anabaena , Oscillatoria , Microcystis and during winter season were Scenedesmus , Pandorina , Cyclotella while during rainy season were Gompospaeria in this river. It was noticed that Anabaena , Scenedesmus , Navicula, were pollution indicator species as they occurred in abundance at highly polluted zone of the river.

The value of coefficient of correlation between various physico-chemical parameters and phytoplankton showed that the temperature and turbidity were found to be negatively correlated with total phytoplankton population while pH, alkalinity and hardness had positive correlation with phytoplankton.

The zooplankton were comprised of protozoa, rotifera, copepoda and cladocera. Protozoa a significant part of the zooplankton, especially in systems exhibiting advanced trophic state. Copepode and clodocerans dominated during monsoon whereas rotifers during summer season copepoda and clodocerans found maximum in rainy season.

The peak time of zooplankton in summer season which stimulate the reproduction and development of zooplankton. The pollution load affect the presence of zooplankton. During the summer, less water flow and some other important nutrients have directly or in directly impact the on development of zooplankton population. Phytoplankton serve as food of zooplankton and their abundance during summer season might have enhanced the number of zooplankton. It showed positive related to phosphate, photoperiod and temperature.

The coliform ranged between 55 to 2000/100ml at different sampling stations. The mean value of MPN ranged between 392.66 to 634.83/100ml in the entire study period. The maximum count of coliform was present in summer and monsoon season at station P_1, P_2, P_3 and P_4 due to temperature, pollutants, run-off, sewage and leaching of organic matter etc, and minimum count was observed in winter season due to low temperature and lack of run-off. It showed positive co-relation with temperature, turbidity at most of the sampling stations. The WHO recommended a desirable limit of coliform is zero number/100ml in drinking water. So, it was found this river water is unbotable.

The various forms of the aquatic weeds were examined during the study period in the Paisuni river. The free floating plants Lemna Paucicostata , Azolla spp. Eichhorinia crassipes etc. appeared on the surface of the water. Whereas the submerged vegetation spp. Hydrilla verticillata , Ceratophyllum demersum , Potamogeton spp. work found. The minimum number was observed in the monsoon period. It was noticed that vallisneria spp. occured in shallow region only.

The economically important fishes are a major components of aquatic biota. Water pollution affects all aquatic organisms and the pollution load changes in fish populations and fisheries. The present study revealed that various fishes of economic values are available in the river water, which represent 21 species and 10 families Viz - Catla catla , Labeo rohita , Labeo calbasu , Labeo bata , Cirrhinus mrigala , Wallago attu , Mystus seenghala , Heteropheustes fossilis , Channa marulius , Notopterus chitala , Mastacembelus armatus were more abundant in river Paisuni, which is the major food substitute with rich proteins and also fulfills the searcity of the food alongwith the employment of majority fisher man which is the main resource of their livelihood.

In india maxied fish culture is an old practics in which Catla catla , Labeo rohita and Cirrhinus mrigala , are surface feeder, coloum feeder and bottom feeder respactively and are used for composite fish farming Mystus seenghala , Calarias, Batrachus , Rita rita and Heteropheustes fossilies are carnivorous fishes, which are found at bottom region of the river. It's flesh are most palaable which would be of great help for fish industry and human beings also. Fishery is of great important to human beings and in addation to providing food most of the fishing industries yield a number of by products of commercial important. But the fish fauna of the river Paisuni was poor due to it's narrowness and shallowness.Which do not provide proper space and in depth. So for the improvement on the fish productivity the management of the river is quite essential.

Conclusion, Aim and Recommendations

On the basis of the entire investigation of the river stretch Paisuni, it is concluded that the river is perennial but shallow and quite narrow, besides pollution was noticed due to which the water is unpotable and fish fauna is also quite poor though the bottom dwelling fish were to some extent more in number than the other fishes.It is due to the muddy bed of the river. At the point of confluence at Kankota Rajapur the fishes were maximum in number it is due to the river Yamuna where the river Paisuni joins it. As the fish fauna of Yamuna river is very rich due to its depth wide basin.

The Aim of the study is to make the river Paisuni pollution free and suitable habitat for the aquatic biota, so that the piousity of this river along with its conservation at the pilgram place of Chitrakoot which has its international fame might be maintained. The water of this river is of equily important as that of holy river Ganga. So it is very essential to make this water suitable and to preserve to for drinking purpose.

The following recommendationsfor the betterment of Paisuni river as regards management,conservation and fisheries are being given as under :

1. Sewage waste should be treated in the treatment plants to avoid the pollution in the river Paisuni, so that the the water might be suitable for drinking.

2. Garbage and other sold waste product are totaly prohidited. These are drawn into pits.

3. During the religious festivals and mass bathing periods, the river water is recommended to be chlorinated by the homogeneous mixing of chlorine or Bleaching powder to control the microbial population.

4. Religious congregation held every year on the occassion of Amavasya, Deepawali on the bank of river Paisuni on this occassion it is advisable that the administration constuct a number of temporary laviatories so that people do not use the river banks for this purpose.

5. Idol immersion on the occassion of pooja times causes siltation and various pollutants entering the river. Thus immersion of idols should be checked to prevent further siltation.

6. Flood causes soil erosion and also degradation in agricultural land of the catchment area. The only best solution to the problem is plantation of river basin.

7. Public awareness and against pollution will definitely help. This will immediately reduce hazords of water pollution not only in city but also. in the villages situated on the banks of the Paisuni river.

Along the above mentioned recommendions, planned management is the only solution for improving the river water quality for drinking and fish production.

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